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# Historical Estimates of World Population: An Evaluation

John D. Durand  
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# Historical Estimates of World Population: An Evaluation

## **Abstract**

A myopic view of history and underdevelopment of theory have been two shortcomings of demography, related to the pragmatism of the discipline and to demographers' predilection for precise measures. A healthy counterpoise is the current surge of interest in demographic history, where questions remote from current practical concerns invite study and exact data are scarce. Historical demography, hitherto an esoteric field of specialization, is now a robustly growing sub-discipline. Historians, archaeologists, and others are also joining in the exploration of neglected demographic fields of history. Demographer's horizons are being stretched, new frontiers of interdisciplinary contact are being opened, and the historical foundations of theory are being strengthened and extended.

## **Disciplines**

Demography, Population, and Ecology | Sociology

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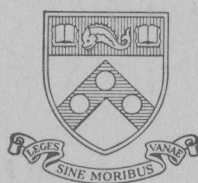
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# HISTORICAL ESTIMATES OF WORLD POPULATION: AN EVALUATION

by

John D. Durand

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Number 10

HISTORICAL ESTIMATES OF WORLD POPULATION:

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John D. Durand

This work will appear as a chapter in a book on historical demography edited by Drs. Maria Luiza Marcilio of the Faculdade de Filosofia, Ciências e Letras de Assis, São Paulo, Brazil, which is being prepared for publication in Portuguese and French. The original version of this chapter in English is published here with the kind permission of the editor.

The work is based partly on results of the author's studies at the East-West Population Institute in 1972. The author wishes to express his gratitude for the opportunity to work at the Institute and for the cooperation and hospitality of its staff.

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University of Pennsylvania

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## Introduction

A myopic view of history and underdevelopment of theory have been two shortcomings of demography, related to the pragmatism of the discipline and to demographers' predilection for precise measures. A healthy counterpoise is the current surge of interest in demographic history, where questions remote from current practical concerns invite study and exact data are scarce. Historical demography, hitherto an esoteric field of specialization, is now a robustly growing sub-discipline. Historians, archaeologists, and others are also joining in the exploration of neglected demographic fields of history. Demographer's horizons are being stretched, new frontiers of interdisciplinary contact are being opened, and the historical foundations of theory are being strengthened and extended.

Although vast areas of world demographic history remain unknown or very uncertainly charted, it is useful to try to fit the known facts and inferences which may be drawn from them together in tentative outlines of major features, for orientation of ongoing historical studies and perspective on current developments and outlooks to the future. Such general views of various aspects of this history have been presented in a number of recent works. Outstanding is the Histoire générale de la population mondiale by Reinhard, Armengaud, and Dupâquier (1968). Its view is panoramic although focussed primarily on Europe with France at the center, and it is furnished liberally with data on population numbers, growth, and characteristics, mortality and fertility, and migrations in various parts of the world in the past. Also useful is the work of Kirsten, Buchholtz, and Kollmann (1955), which gives a running account of population numbers and changes in the context of historical



events in successive periods, region by region around the world. A chapter of the monumental United Nations work, The Determinants and Consequences of Population Trends, now published in a revised and up-dated (1973) edition, presents a concise, global summary of demographic history with a wealth of bibliographical references. Coale (1974), in a brief, thoughtful and readable article, surveys the history of growth of the world's human population since its beginning. Cipolla (1962) and Wrigley (1969) are less concerned with the narrative and more with the interpretation of demographic history in relation to economic history. Clark (1968) presents series of population estimates over the last two millenia for the world and its parts, pieced together from the works of many authors. Clark also reviews evidence relevant to mortality, fertility, and the power of natural increase of human populations in the past and present and examines historical relationships between population and economic development with special attention to agriculture and modes of land use. Borrie's (1970) survey of world demographic history includes an authoritative summary of the principal international migrations during recent centuries. Davis (1974) sums up briefly the role of migrations in the advance of technology and the growth of population since prehistoric ages. Indications of the force of mortality and the length of life in human populations since early prehistoric times are reviewed by Vallois (1960), Acsadi and Nemeskeri (1970), and Weiss (1973). Chandler and Fox (1974) present a great array of estimates of city populations in all parts of the world since the time of Moses.

The present survey is focussed on long-range historical estimates of population in the world and major regional sectors. First, a scheme for grading the reliability of historical population estimates in view of the kinds of data and assumptions on which they are founded will be described. Then estimates of population in various regions of the world since the beginning of the

Christian Era will be reviewed, their basis examined, and their reliability assessed. Finally, an outline of the global picture of growth of the earth's human population during the last two millenia will be sketched and confidence in some of its principal features as indicated by present information will be weighed.

### Grading of reliability of estimates

There are two types of historical population estimates: (a) benchmark estimates, derived from data relevant to the size of the population at a given time, and (b) projected estimates, carried forward or backward from a benchmark or interpolated between benchmarks by means of data or assumptions relevant to changes in the population over time.

Benchmark estimates may be graded for reliability according to the types of data from which they are derived, as follows:

Grade A: Census or population registration statistics of good quality covering the whole or nearly the whole population

Grade B: (1) Census or registration statistics of doubtful or defective quality

(2) Statistics of segments of the population such as sex-age groups, persons subject to poll tax or military service, church members, etc.

(3) Statistics of households, dwellings, hearths, etc.

Grade C: (1) Non-demographic quantitative data such as numbers and areas of cities and other settlement sites, areas of cultivated land, land-tax revenues, consumption of food staples, strength of military forces, etc.

(2) Estimate of the population of a city used as a basis for estimating population in a region which it served as a center

(3) Population estimates made by contemporary observers and those cited in contemporary writings without specification of their basis



Grade D: Inferences about size or density of the population from information about the type of economy, technology, social and political organization, etc.

Of course, the reliability of estimates does not depend only on the types of data. For example, in population estimates derived from numbers of households, reliability varies with the quality of information about the average size of households. Likewise in estimates derived from data on numbers and areas of cities, reliability depends on how well the relationships between city areas and city populations and between urban and rural populations can be estimated. The classification outlined above provides only a crude grading of reliability, but refinements would multiply difficulties in applying the scheme objectively to a wide range of historical estimates.

At present, thanks to the recent progress of census-taking in less developed countries, few countries remain without statistics of at least one census to serve as benchmarks for current population estimates. A study of the reliability of world population estimates for 1969 (United Nations, Demographic Yearbook, 1970, chapter 1) showed that estimates for 173 countries in the total of 215 were projected from census benchmarks or derived from continuous population registers, and these 173 countries had 95 percent of the estimated world population. Although the quality of the recent census benchmarks varies, most of them are reliable enough to be graded A in the context of an appraisal of historical population estimates. But the span of Grade A data is not long in any part of the world. Japan's record of the Tokugawa registration statistics, which represent a great majority of the population in the period 1726 to 1852, gives that country a claim to first place in historical depth of Grade A data. Census series of good quality go back to eighteenth-century dates in some European countries but it was not until the latter half of the nineteenth century that nearly all of Europe's population was covered

by censuses. The first comprehensive census of the Russian Empire was taken in 1897. The series of Indian censuses begins in 1872 but virtually complete coverage of the population was first achieved in the census of 1911 (Davis, 1951; Datta, 1960). A large majority of the population in Northern America has been represented by census statistics since the first Federal census of the United States in 1790 and virtually all of it since the first Dominion census of Canada in 1851. A substantial majority of the population in Middle and South America was covered by fairly reliable censuses before the end of the nineteenth century. That position was reached in Southeastern Asia and Northern Africa early in the twentieth century. In Southwestern Asia, the series of Turkish censuses begins in 1927 but little of the population in the rest of the region was enumerated before the 1950's and no comprehensive census has been taken yet in Saudi Arabia, Yemen, and some of the other Arabian countries. The case of Tropical Africa is similar. China's first modern census was taken in 1953 and the reliability of the count is uncertain (Taeuber and Wang, 1960; Aird, 1968).

China, however, has a long historical record of Grade B census or population registration statistics, doubtful or poor in quality, which stretches back intermittently to the time of the Han Dynasty (A.D. 2) and even beyond. There are also some such statistics for Japan as far back as the seventh century. Records of local censuses and various other kinds of data which serve as Grade B foundations for population estimates are available in parts of Europe from the eleventh century onward and in European Russia and parts of America since the seventeenth century. Data of the types listed above under Grade C are the mainstay of population estimates for periods before the beginnings of the census series in India, Southwestern Asia, and Northern Africa. For the Roman Empire about the beginning of the Christian Era, the enigmatic



record of the censuses of Roman citizens and fragments of other demographic data are supplemented by historical information of Grade C types. The rest of the history of population growth in various regions of the world has been sketched mainly by means of Grade D estimates or shaky projections from distant  
1  
benchmarks.

Projected estimates have two components of reliability: that of the benchmarks from which the projections are launched and that of the estimated changes during the projection period. Types of data and assumptions used for projecting historical population estimates may be graded for reliability as follows:

Grade A: Records of births, deaths, immigration, and emigration of good enough quality to make a satisfactory calculation of the balances of population increase or decrease over the period of the projection

Grade B: (1) Partial or incomplete records of births, deaths, and migration

(2) Estimates of levels and changes of mortality, fertility, natural increase, and net migration rates derived from other kinds of demographic data

(3) Time-series of data of the types graded B and C in the classification of data for benchmark estimates

Grade C: Non-quantitative historical or archaeological information on such events as epidemics, famines, wars, natural catastrophes, establishment of new settlements or abandonment of old ones, extension or contraction of areas of cultivated land, increase or decrease in intensity of land use, etc.

Grade D: Assumed rates of population growth, not based on data for the area and time-period of the projection

Most of the more developed countries and some less developed countries have current statistics of births, deaths, and migration whereby estimates

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Data for studies in historical demography are discussed at length by Hollingsworth (1969) with chief reference to the Old World. For America, see also Borah (1970).

of their population are interpolated between censuses and brought up to date from the latest censuses with little loss of accuracy. In the United Nations study of reliability of population estimates as of 1969, it was found that about one-fourth of the world population was in countries where the estimates were brought forward annually by means of current statistical records considered adequate for the purpose. For the remainder, estimates were projected from the latest benchmarks in various ways, sometimes with the use of Grade B data in the above classification (such as estimates of birth and death rates derived from household sample surveys or sample-area registration projects), sometimes with projections of population growth rates derived from the data of past censuses, and sometimes with merely conjectured growth rates (Grade D). The uncertainty in projections made in these ways commonly becomes the main source of error in current population estimates when the benchmarks are more than a few years old. The results of the United Nations study (Demographic Yearbook, 1970, chapter 1) show that for less developed regions and the world as a whole, reliability is less satisfactory in estimates of the current rates of growth than in those of population size. For example, estimated annual growth rates during 1963-1969 were bracketed in the wide error ranges of 1.4-2.2 percent for China, 2.3-2.7 percent for India, and 1.8-2.1 percent for the world total, while the rate for Europe (without the U.S.S.R.) was pinpointed in the narrow range of 0.8-0.9 percent.

Time-series of Grade A data for projection of historical population estimates go back to the eighteenth century in the Scandinavian countries and to various dates in the nineteenth century for most other countries in Europe while their span is generally shorter in other parts of the world where such data are currently available. In the absence of such data, various kinds of Grade B data have sometimes been used for projecting historical estimates. For



example, estimates of the population of England and Wales have been interpolated between a 1695 benchmark and the census of 1801 by means of data from parish registers of christenings and burials which omit nonconformists and are not reliably complete for members of the established church (Glass, 1965). Mainly, though, historical projections have been made with more or less conjectural assumptions as to long-term growth rates and effects of historically documented events such as epidemics, famines, and wars.

In the following appraisal of population estimates for regions of the world since the beginning of the Christian Era, projected estimates are graded the same as their benchmarks where Grade A data were used for the projection and in any event where the projection period was short enough and conditions were stable enough to afford little risk of major errors. Otherwise projected estimates are graded down from their benchmarks, taking into account the length of the projection and the conditions of the time as well as the kinds of data or assumptions employed, and considering that interpolations are generally more reliable than projections from a single benchmark. Although an effort is made to be as objective as possible in the grading, an important element of personal judgment enters unavoidably.

#### Estimates for regions since the time of Christ

The most comprehensive and detailed series of population estimates for the world, region by region, since the beginning of the Christian Era is Clark's (1968) series, which he composed by selecting estimates from the works of many authors and filling in some of his own. Table 1 shows Clark's estimates for selected dates between A.D. 14 and 1900, recast into a classification of fifteen regional segments. The series is brought up to date with 1970 estimates from the United Nations Demographic Yearbook, 1971. The table also

Table 1. Population estimates for world regions since the time of Christ, according to Clark

(Figures in millions. Letter codes denote grades of reliability. 1970 estimates according to United Nations.)

|  | A.D. 14 | 1000 | 1200  | 1500  | 1750  | 1900    | 1970  |
|--|---------|------|-------|-------|-------|---------|-------|
| World total                                | 256     | 280  | 384   | 427   | 731   | 1,668   | 3,632 |
| China <sup>a</sup>                         | 73 B    | 60 B | 123 B | 100 C | 207 B | 500 C   | 765 B |
| India-Pakistan-Bangladesh                  | 70 D    | 70 D | 75 D  | 79 D  | 100 C | 283 A   | 667 A |
| Southwestern Asia, total                   | 34      | 22   | 21    | 15    | 13    | 8 38 C  | 103 B |
| Asia Minor, Syria, and Cyprus <sup>b</sup> | 14 C    | 10 D | 10 D  | 8 D   | 7 D   | -       | -     |
| Other Southwestern Asia <sup>c</sup>       | 20 D    | 12 D | 11 D  | 7 D   | 6 D   | -       | -     |
| Japan                                      | 2 D     | 10 C | 12 C  | 16 C  | 26 A  | 44 A    | 103 A |
| Remainder of Asia exc. U.S.S.R.            | 5 D     | 10 D | 11 D  | 15 D  | 32 D  | 8 120 B | 415 B |
| Europe exc. U.S.S.R., total                | 37      | 32   | 45    | 62    | 102   | 284 A   | 465 A |
| Southern Europe <sup>d</sup>               | 32 C    | 24 C | 33 C  | 39 C  | 60 B  | -       | -     |
| Northern Europe                            | 5 D     | 8 C  | 12 C  | 23 C  | 42 B  | -       | -     |
| U.S.S.R., total                            | 8       | 12   | 12    | 12    | 34    | 127     | 243   |
| European part                              | h3 D    | 7 D  | 6 D   | 6 C   | 28 B  | 8 110 A | 183 A |
| Asian part                                 | 5 C     | 5 D  | 6 D   | 6 D   | 6 D   | 8 17 B  | 60 A  |
| Africa, total                              | 23      | 50   | 61    | 85    | 100   | 122     | 345   |
| Northern Africa <sup>e</sup>               | 11 C    | 4 D  | 4 D   | 6 D   | 5 D   | 8 27 B  | 71 A  |
| Remainder of Africa                        | 12 D    | 46 D | 57 D  | 79 D  | 95 D  | 8 95 C  | 274 B |
| America, total                             | 3 D     | 13 D | 23 D  | 41    | 15    | 144     | 511   |
| Northern America <sup>f</sup>              | -       | -    | -     | 1 D   | 2 B   | 81 A    | 228 A |
| Middle and South America                   | -       | -    | -     | 40 D  | 13 C  | 63 B    | 283 A |
| Oceania                                    | 1 D     | 1 D  | 1 D   | 2 D   | 2 C   | 6 A     | 19 A  |



## Table 1 notes

### Sources:

A.D. 14-1900, except as noted: Clark (1968), tables III.1 (p. 64) and III.15 (p. 108).

1970: United Nations Demographic Yearbook, 1971.

- a Present area, including Manchuria, Inner Mongolia, Sinkiang, Tsinghai, Tibet, and Taiwan as well as historic China Proper.
- b Asian sector of the Roman Empire in A.D. 14.
- c Iran, Iraq, Arabian countries, and other parts of southwestern Asia outside the borders of the Roman Empire in A.D. 14.
- d Total of estimates for areas corresponding approximately to the territories of the Roman Empire in Europe in A.D. 14 (France, Belgium, Netherlands, Spain, Portugal, Italy, Greece, and the "Rest of S. E. Europe" in the nomenclature of Clark's table).
- e Egypt, Libya, Tunisia, Algeria, and Morocco.
- f United States, Canada, Greenland, Bermuda, and St. Pierre and Miquelon.
- g Estimates for regions not shown separately in Clark's tabulation, derived from other sources in such a way as to agree with Clark's totals for broader regions.
- h In Clark's total estimate of 4 million for Russia in Europe, "Poland, Czechoslovakia, etc.", and Hungary, 3 million are allocated to Russia in order to complete the regional classification in the form given here.

Table 2. Indifference ranges of population estimates for world regions since the time of Christ

(millions)

|                                 | A.D. 0  | 1000    | 1500    | 1750    | 1900        | 1970        |
|---------------------------------|---------|---------|---------|---------|-------------|-------------|
| World total                     | 270-330 | 275-345 | 440-540 | 735-805 | 1,650-1,710 | 3,600-3,700 |
| China                           | 70-90   | 50-80   | 100-150 | 190-225 | 400-450     | 750-850     |
| India-Pakistan-Bangladesh       | 50-100  | 50-100  | 75-150  | 160-200 | 285-295     | 660-685     |
| Southwestern Asia               | 25-45   | 20-30   | 20-30   | 25-35   | 40-45       | 105-115     |
| Japan                           | 1-2     | 3-8     | 15-20   | 29-30   | 44-45       | 103         |
| Remainder of Asia exc. U.S.S.R. | 8-20    | 10-25   | 15-30   | 35-55   | 110-125     | 410-435     |
| II Europe exc. U.S.S.R.         | 30-40   | 30-40   | 60-70   | 120-135 | 295-300     | 420-425     |
| U.S.S.R.                        | 5-10    | 6-15    | 10-18   | 30-40   | 130-135     | 243-244     |
| Northern Africa                 | 10-15   | 5-10    | 6-12    | 10-15   | 53-55       | 71-73       |
| Remainder of Africa             | 15-30   | 20-40   | 30-60   | 50-80   | 90-120      | 270-290     |
| Northern America                | 1-2     | 2-3     | 2-3     | 2-3     | 82-83       | 228-229     |
| Middle and South America        | 6-15    | 20-50   | 30-60   | 13-18   | 71-78       | 280-295     |
| Oceania                         | 1-2     | 1-2     | 1-2     | 2       | 6           | 6           |



shows my grading of the reliability of these estimates according to the scheme outlined above. The figures for Europe and some of those for other regions are sums of estimates for component areas which I have appraised separately to arrive at reliability grades for the regional totals. For the purpose of this grading, I have attached no very precise significance to the dates of the estimates before 1750; they are better interpreted as referring to centuries than to particular years. For example, although Clark dates the initial estimates in his series A.D. 14 for all regions, this particular date (death of Augustus) is relevant only to estimates for the Roman Empire.

Another view of regional population trends over the last two millennia is presented in table 2, in terms of indifference ranges of estimates for each region at successive dates. These are not intended to define limits of possible errors in the estimates; such limits would be wider. Rather, the indifference ranges define limits within which, in my judgment, there seems to be little ground for preference between lower and higher figures. For example, when the United Nations estimate of 3,632 million people in the world in 1970 is bracketed in the indifference range of 3,600 to 3,700 million, the possibility is not excluded that the number might actually have been nearer to 3,800 million. A true total of 3,800 million would mean that the United Nations estimate was understated by about 4.5 percent, which does not seem to be out of the question when all risks of error are considered, including the possibility of substantial undetected undercounting in many censuses. However, an estimate in the range of 3,600 to 3,700 million is considered more likely to be correct.<sup>1</sup>

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<sup>1</sup> United Nations demographers bracketed the world population estimate for 1969 in an "error range" of 3,535-3,648 million (Demographic Yearbook, 1970, chapter 1). It is doubtful that precision has improved in the estimates for 1970 and more recent years, in spite of the taking of new censuses in many

Special attention will be given, in the following discussion, to the historical estimates for three principal regions of ancient high civilization in the Old World which contained a large majority of the earth's human inhabitants at the time of Christ, namely China, India-Pakistan-Bangladesh, and the Roman Empire. According to Clark's estimates, these three regions had over three-fourths of the world population in A.D. 14, and they still hold nearly one-half of the total at present. Estimates for these regions are crucial in the attempt to determine approximately the size of the world population at the beginning of the Christian Era and its increase since that time.

China.--Ironically, the country where the biggest questionmark appears on the present map of world population is the richest of all in historical population statistics. Between A.D. 2, when the golden age of the Western Han Dynasty was drawing to a close, and 1911, when the last emperor of the Ch'ing Dynasty abdicated, there are records of hundreds of censuses in China, or more properly, periodic compilations of numbers of households and persons reported as listed on local registers throughout the empire. But none of these statistics can be rated

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(footnote 1, page 12, continued) countries. The estimate for China, which is the principal source of uncertainty as regards the size of the world total, grows more doubtful year by year.

The indifference ranges of the world total population estimates in table 2 were derived from the ranges of the regional estimates with allowance for the expectation that positive and negative deviations from the midpoints of the regional ranges would partly compensate one another in the world total. Denoting by  $m_i$  the midpoint of the indifference range for region  $i$  and by  $d_i$  the difference between the midpoint and either extreme of the range for region  $i$ , the midpoint of the world total range was calculated as  $\sum m_i$  and the difference between the midpoint and either extreme of the world total range was calculated as

$\sqrt{\sum (d_i^2)}$ . The implied assumption is that the probability distribution of population estimates for each region is that of a normal curve with a midpoint of  $m_i$  and standard deviation,  $\sigma = d_i$ . The limits of the world total indifference ranges obtained in this way were rounded to the figures shown in table 2.

better than Grade B of reliability and in many periods they are plainly too defective to be useful for population estimates.

An expurgated and adjusted series of these statistics (Durand, 1960) retains those of A.D. 2 (Western Han Dynasty), 88-156 (Eastern Han), 606 (Sui), 705-755 (T'ang), 1014-1103 (Sung), 1193-1195 (Sung in the south of China, Chin in the north), 1381-1393 (Ming), 1751-1851 (Ch'ing) and 1953. Perkins (1969) gives reasons for rating the statistics of the Yu<sup>an</sup> (Mongol) Dynasty, near the end of the thirteenth century, also as useful bases for estimates. Table 3 shows totals of persons and households recorded at selected dates in these periods and totals of persons adjusted to improve consistency in the series. Between these periods, if any statistics are on record, they cover only parts of China or are defective or not comparable in definitions. In the latter years of the Ming period (fifteenth and sixteenth centuries) and early years of the Ch'ing (late seventeenth and early eighteenth centuries), the statistics were recorded in conventionalized tax units which bore no definable relation to population (Ho, 1959). After 1851, the imperial government was no longer able to get statistical reports from all provinces, and likewise the censuses attempted under the republic prior to 1953 failed to achieve complete coverage.

In the Han, Sui, Sung, and Yu<sup>an</sup> Dynasty statistics, which show relatively low ratios of numbers of persons to households, the adjusted totals of persons shown in table 3 were calculated by multiplying the recorded numbers of households by 6, which is the approximate level of person/household ratios recorded in the T'ang and Ming statistics. The hypothesis here is that, in the Han, Sui, Sung, and Yu<sup>an</sup> periods, either the registration of household members was relatively defective or the definitions of classes of individuals to be registered and counted were relatively restricted. This is uncertain because the actual average size of households may not have been the same in different periods and



Table 3. Chinese census or registration statistics, selected dates, A.D. 2-1953

| Dates   | Dynasties     | Recorded totals   |                   | Adjusted totals, persons |                                  |
|---------|---------------|-------------------|-------------------|--------------------------|----------------------------------|
|         |               | Persons           | Households        | All areas                | Within China Proper <sup>a</sup> |
|         |               | (millions)        |                   | (millions)               |                                  |
| A.D. 2  | Western Han   | 59.6              | 12.2              | 4.9                      | 74 <sup>b</sup> <sub>71</sub>    |
| 88      | Eastern Han   | 43.4              | 7.5               | 5.8                      | 45 <sup>b</sup> <sub>43</sub>    |
| 156     | Eastern Han   | 56.5              | 10.7              | 5.5                      | 64 <sup>b</sup> <sub>62</sub>    |
| 606     | Sui           | 46.0              | 8.9               | 5.2                      | 53                               |
| 705     | T'ang         | 37.1              | 6.2               | 6.0                      | 37                               |
| 755     | T'ang         | 52.9              | 8.9               | 5.9                      | 53                               |
| 1014    | Sung          | 22.0              | 9.1               | 2.4                      | 55                               |
| 1103    | Sung          | 46.0              | 20.5              | 2.2                      | 123                              |
| 1193-95 | Sung and Chin | <sup>c</sup> 76.3 | <sup>c</sup> 19.5 | -                        | <sup>c</sup> 121                 |
| 1290    | Yuan (Mongol) | 58.8              | 13.2              | 4.5                      | 86                               |
| 1393    | Ming          | 60.5              | 10.6              | 5.7                      | 61                               |
| 1751    | Ch'ing        | 181.8             | -                 | -                        | 209 <sup>d</sup> <sub>206</sub>  |
| 1774    | Ch'ing        | 221.0             | -                 | -                        | 261 <sup>d</sup> <sub>260</sub>  |
| 1775    | Ch'ing        | 264.6             | -                 | -                        | 265 <sup>d</sup> <sub>264</sub>  |
| 1805    | Ch'ing        | 332.2             | -                 | -                        | 332 <sup>d</sup> <sub>331</sub>  |
| 1851    | Ch'ing        | 431.9             | -                 | -                        | 432 <sup>d</sup> <sub>429</sub>  |
| 1953    | People's Rep. | 582.6             | -                 | -                        | 583                              |

a

In terms of the 1953 census classification of areas, China Proper as defined for the purpose of this classification comprises Hopei, Shansi, Shensi, Kansu, Szechwan, Yunnan, and the provinces on the mainland to the south and east of these.

b

Not including Fukien and adjacent areas in southeastern China, which were outside the Han empire.

c

Sums of figures for southern China under the rule of the Sung and northern China under the rule of the Chin Dynasty, as follows:

|                 | Recorded persons | Recorded households | Persons per hh. | Adjusted persons |
|-----------------|------------------|---------------------|-----------------|------------------|
| Sung, 1193..... | 27.8             | 12.3                | 2.3             | 73               |
| Chin, 1195..... | 48.5             | 7.2                 | 6.7             | 48               |

d

Including Sinkiang, combined in the Ch'ing Dynasty statistics with Kansu, and Taiwan, combined with Fukien.

because the definitions and reporting of households as well as individuals may have varied. The uncertainty is greatest in the interpretation of the Sung statistics, which show person/household ratios in the low range of 1.5-2.5, suggesting that only adult male household members may have been reported. Usher (1930) interpreted the Sung statistics as referring to all males irrespective of age; doubling the recorded numbers of persons in order to include females and adding 20 percent for under-registration, Usher derived population estimates for China in the eleventh century about 25 percent below the level of the adjusted series shown in table 3. In this series for the period between 1751 and 1774, the recorded totals of persons have been increased to eliminate the discrepancy between the numbers reported in 1774 and 1775, on the hypothesis that this was due to defective registration or statistical reporting before 1775. This, too, is uncertain; some authors have preferred to suppose that the figures were artificially inflated in 1775 and later years to please the emperor (Willcox, 1940, among others). To improve consistency of geographical coverage, the statistics of the Han, Sui, T'ang, and Ch'ing periods and the 1953 census were adjusted further by deducting returns from areas outside historic China Proper, in Manchuria, Korea, Mongolia, Sinkiang, Tsinghai, Tibet, Viet Nam, or elsewhere. It would be logical to add estimates for areas within China Proper that were not included in the statistics of some periods (notably Fukien Province and neighboring parts of southeastern China which were outside the empire in the Han period), but this has not been attempted here.

It is not at all sure that this adjusted series of statistics reflects the population trend faithfully. There are several reasons for suspecting understatement, especially in the Ming and earlier periods. Because the registers and statistical reports were used for purposes of taxation and military conscription, households and individuals subject to these duties had a motive to evade

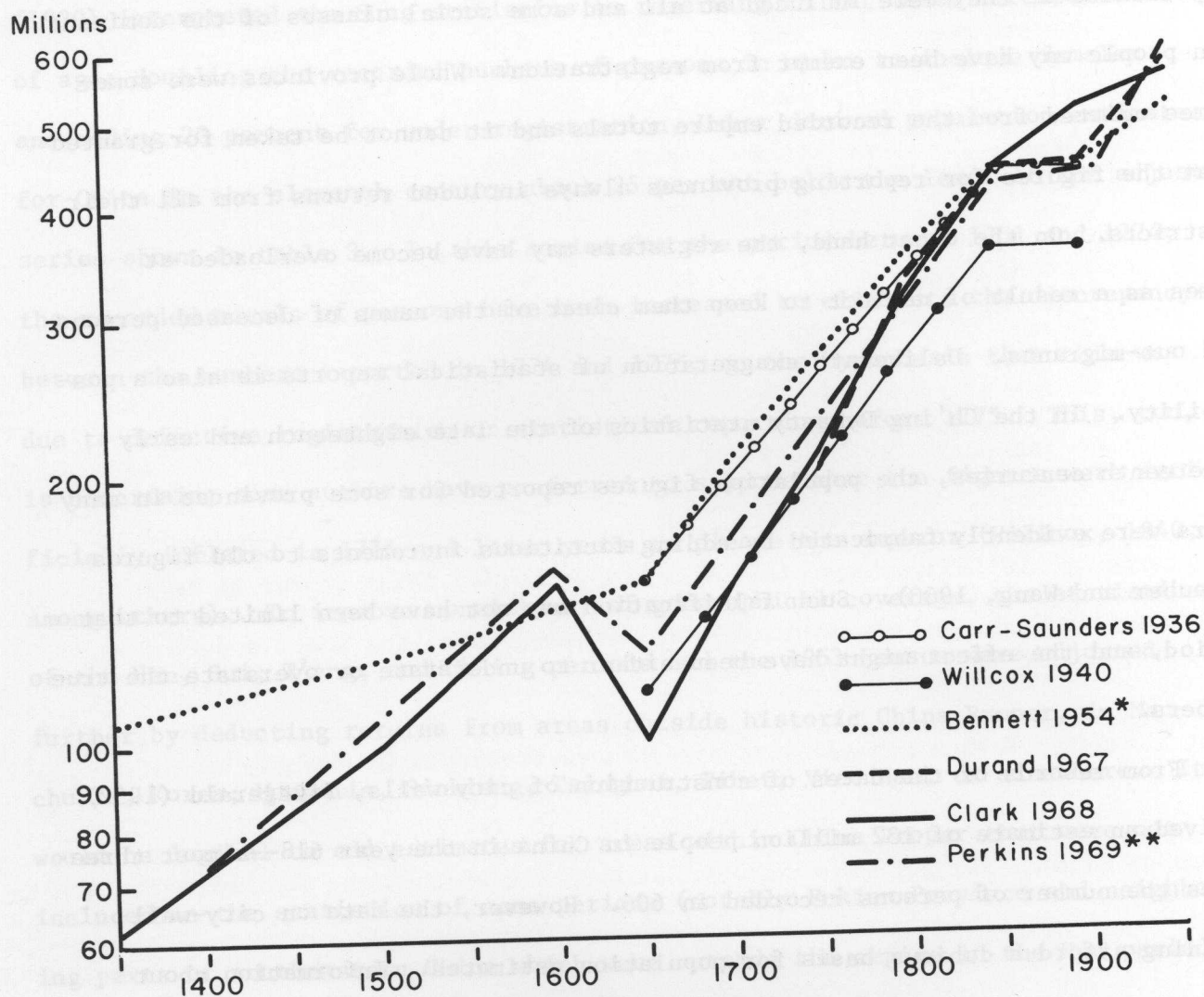
registration and local officials may have found it politic to minimize the numbers reported. The registration of women and children is likely to have been often neglected; deficits of females have been detected in studies of local records of various periods. Ethnic minorities are unlikely to have been fully represented if they were included at all and some social classes of the dominant Han people may have been exempt from registration. Whole provinces were sometimes omitted from the recorded empire totals and it cannot be taken for granted that the figures for reporting provinces always included returns from all their districts. On the other hand, the registers may have become overloaded at times as a result of neglect to keep them clear of the names of deceased persons and out-migrants. Deliberate exaggeration of statistical reports is also a possibility. In the Ch'ing Dynasty statistics of the late eighteenth and early nineteenth centuries, the population figures reported for some provinces in many years were evidently fabricated by adding fictitious increments to old figures (Taeuber and Wang, 1960). Such falsification may not have been limited to that period, and the effect might have been either to understate or overstate the true numbers.

From records of the dates of construction of city walls, Fitzgerald (1932) derived an estimate of 132 million people in China in the year 618--almost three times the number of persons recorded in 606. However, the data on city-wall building afford a dubious basis for population estimates. Information about what the walls enclosed is lacking; it might often have been only a village or a fort.

Clark based his historical estimates of China's population (table 1) on the series of adjusted statistics (table 3) with conjectural interpolations over intervals in which statistics are lacking or defective. His estimates since the fourteenth century are charted in figure 1 with those of several other authors.



FIGURE 1. CHINA: POPULATION ESTIMATES SINCE THE FOURTEENTH CENTURY A.D.



\*

Estimates refer to "China Major", including Korea and Outer Mongolia.

\*\*

Midpoints of estimated ranges.

In the gap between the late years of the fourteenth century (when the Ming statistics are thought to have been fairly reliable) and the middle of the eighteenth century (when the Ch'ing statistics as adjusted may possibly represent the order of size of the population fairly well), Clark interpolated estimates following Ho's (1959) indications of the probable form of the population trend. The population is presumed to have increased during the fifteenth and sixteenth centuries and fallen back during the first half of the seventeenth century as a result of the fighting, massacres, economic disruption, famines, and epidemics which attended the decline of the Ming Dynasty and its overthrow by the Ch'ing. Perkins (1969) postulates a similar trend with a more conservative guess at the amount of the population loss between 1600 and 1650. Carr-Saunders' (1936) higher estimate of the population in 1650 was found on Fitzgerald's (1932, 1936) findings, which led Carr-Saunders to hypothesize that China's population had not more than tripled since the seventeenth century. Willcox (1940) derived his estimate for 1650 from the early statistics of the Ch'ing Dynasty series with an interpretation of their definition which Ho's study has shown to be incorrect.

Between 1750 and 1850, Durand's, Clark's, and Perkins' estimates follow the trend of the recorded population statistics with adjustments. Carr-Saunders and Willcox rejected these statistics, preferring to make interpolations with assumed growth rates between their estimates for 1650 and recent dates. The 1953 census results make it apparent that Willcox underestimated China's population at the time of his writing and consequently his estimates for 1900, 1850, and probably 1800 were understated. Bennett also rejected the statistics and made estimates by interpolation on a hypothetical trend between a conjectured figure of 70 million in A.D. 1000 and an estimate of 503 million in 1949 (for "China Major", including Korea and Outer Mongolia as well as the



present territory of the People's Republic).

There is no solid statistical foundation for estimates of China's population in the interval between 1851 and 1953. In accordance with the prevailing opinion among historians, most authors have assumed that the population made little if any growth between 1850 and 1900, considering the enormous loss of life in the Tai-Ping Rebellion of the 1850's as well as other upheavals and natural catastrophes which followed in the latter decades of the nineteenth century. However, Perkins' estimate of the population in 1913, derived from the incomplete census returns of that year, implies a modest increase from 1850 to 1913. Clark's interpolation of an estimate of 500 million in 1900 is unique in suggesting a higher average growth rate in 1850-1900 than in 1900-1950.

In conclusion, it appears certain that China's population was large at the beginning of the Christian Era, probably at least 70 million and possibly more than 100 million. An indifference range of 70-90 million is suggested in table 2 for estimates of the population at that time within the present territory of the People's Republic. The trend over the next ten centuries seems to have been one of ups and downs with little or no net gain in the long run. Peaks of population were apparently reached under the Western Han Dynasty in the first century B.C., the Eastern Han in the second century A.D., and the T'ang in the eighth century. Probably the deepest and longest depopulation was in the chaotic interval between the disintegration of the Han Empire early in the third century and the re-unification under the Sui rule late in the sixth century. Substantial population losses apparently occurred also during the interregnum between the two Han Dynasties in the early years of the first century and again in the second half of the eighth century, when An Lu-shan's rebellion broke the peace of the T'ang Empire. The statistical records provide no reliable measures of these losses.

Since A.D. 1000, four major periods of expansion in China's population and three intervals of relatively stationary or decreasing population can be discerned. The periods of greatest growth were the eleventh century, the fifteenth and sixteenth, the eighteenth and early nineteenth, and the twentieth century especially since the establishment of the People's Republic. A major loss was apparently sustained in the thirteenth and fourteenth centuries. Historians blame depopulation in this period chiefly on the disruption of the agricultural economy in northern China under the Mongol rule and the killings, famines, and epidemics associated with the struggle whereby the Mongols were finally evicted in 1368 (Hartwell, 1967; Perkins, 1969). The set-backs of population growth in the first half of the seventeenth century and the latter half of the nineteenth were mentioned above. The growth in the eleventh century probably brought China's population to a considerably higher level than was reached at the peaks during the preceding millenium. Although the statistical record is equivocal in this respect, other historical evidence of the expansion of settlement in the south and the rise of urbanization during the era of the Sung Dynasty supports the view that new order of size of the Chinese population was reached at this time. It is uncertain whether or not the twelfth-century level was surpassed at the height of population in the Ming period, about the end of the sixteenth century. Certainly a much higher level was reached before the end of the eighteenth century and much higher yet before the events of the mid-twentieth century brought China fully into the modern age.

India-Pakistan-Bangladesh.--The region now composed of these three countries will be called simply India for convenience in the following discussion. The growth of its population since 1871 is reliably measured by decennial census statistics, subject to only relatively minor uncertainty in corrections for underenumeration and omission of areas in the early censuses. There are also



records of censuses taken in parts of the region earlier in the nineteenth century, which Das Gupta and his associates (1969) used to project estimates of the regional population back to 1800. These data may be biased toward exaggeration of the increase between 1800 and 1871 if the enumerations were more nearly complete in the later than in the earlier censuses. Demographic statistics from earlier periods in India are almost totally lacking. Only a few numbers referring to the population of certain cities and local regions are found in the medieval and ancient chronicles, usually without indication of their source. Population registers are believed to have been kept in ancient India but this practice went out of fashion early in the Christian Era (Das Gupta, 1972).

All estimates of population in this region before the nineteenth century have a more or less flimsy basis in Grade C historical data and Grade D projections. Here are some estimates for dates up to 1600:

|              | Population<br>(millions) | Author           |
|--------------|--------------------------|------------------|
| 320 B.C.     | 181                      | Datta (1962)     |
| 232 B.C.     | 100-104                  | Pran Nath (1929) |
| A.D. 629-645 | 22-37                    | Russell (1969)   |
| A.D. 1360    | 190                      | Datta (1971)     |
| A.D. 1600    | 100                      | Moreland (1920)  |

To illustrate the uncertainty of these estimates: Datta based his calculations relevant to the size of India's population at the time of the Emperor Chandragupta Maurya (320 B.C.) on the size of Chandragupta's army, said to have numbered 700,000 men, and information about the imperial revenues and expenditures from which Datta gathered that about 1/20 of the empire's total product went to maintain the army, 3/20 to other imperial expenses, and 16/20 to support the civilian population. Supposing that each soldier had a family and a servant who also had a family, that the average income of military and civilian families was

the same (so that there would be 16 civilian families for each military family), and that the average size of families was 6 persons, Datta arrived at estimates of 1.4 million military and 22.4 million civilian families and 143 million people in Chandragupta's empire. The estimate of 181 million in all India was derived by assuming that the ratio of population in the areas within the empire to the all-Indian total was the same at that time as it was in 1961. The result could easily be reduced by one-half or more by substituting different assumptions without strain on plausibility, even if the accuracy of the data on size of the army and imperial revenues and expenditures were not questioned. Pran Nath's estimate of the population in the time of Chandragupta's grandson, Asoka, was likewise based mainly on the reported strength of military forces and is subject to similar uncertainty.

Russell's much lower estimate of the population in A.D. 629-645 was derived from information about the length of walls surrounding a number of cities given in the diary of the Chinese Buddhist pilgrim, Hiven Tsang, who travelled through much of India during that period. These data make it apparent that the Indian cities of the seventh century were not large. Probably none of those mentioned by Hiven Tsang had more than 75,000 inhabitants although some which he found in ruins (including Pataliputra) might have had a larger population at an earlier time. The main factor of uncertainty in Russell's estimate is the lack of information about the urban-rural population ratio, which he estimated in view of relationships found in historical studies in other regions. Of course, if a lower degree of urbanization were assumed, the population estimate derived from the data on size of the cities would be raised, but it is apparent that India in the seventh century must have been very little urbanized if the size of the population was of the order of 100 million.

The basis of Datta's estimate of the population in A.D. 1360 is less



substantial. It was derived from a record of the amount of revenue from land taxes in the Tughlak Empire under the rule of Firuz (1351-1388), which comprised about one-third of India's area. Datta presented this estimate as "at best tentative" but did not regard it as inconsistent with Moreland's much lower estimate of the population two and one-half centuries later.

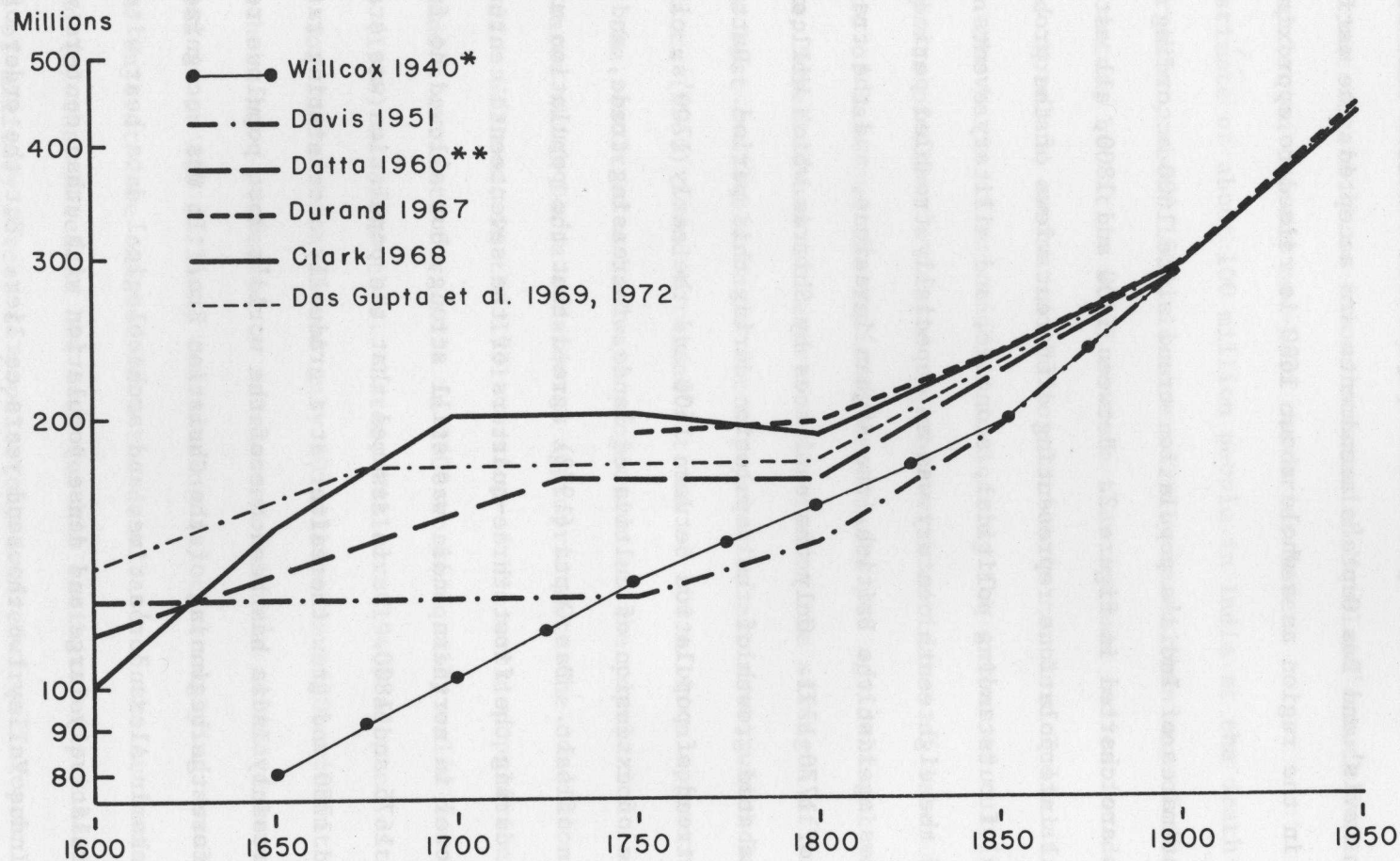
Moreland's estimate of about 100 million people in India at the death of the Mogul Emperor Akbar, about 1600, is more solidly based than any of the estimates for earlier dates, but it is still no more than a crude indication derived from Grade C data. Moreland estimated the population in northern India at 70 million, mainly on the basis of tax records indicating the extent of cultivated lands in various parts of Akbar's domain together with estimates of labor requirements per unit of land and the ratio of dependants per agricultural worker. For southern India, Moreland had to resort to reports on the strength of military forces as the best available basis for a population estimate, which he put at 30 million. Datta (1960) found Moreland's total of 100 million approximately in agreement with the result of a backward projection of the population from 1872 with growth rates which Datta considered appropriate to the conditions of intervening periods. Willcox, in the 1931 version of his world population estimates, took Moreland's estimate for India in 1600 to be equally valid for 1650, and Carr-Saunders (1936) accepted this. Later, Willcox (1940) adopted estimates by Shirras (1933) for India which showed only 80 million in 1650, without explanation. Other authors have preferred to increase Moreland's estimate somewhat. Davis (1951) raised it to 125 million, considering (a) that outlying areas of Bengal, Assam, and Gujarat were omitted from the data base of the estimate for northern India and (b) that Moreland had used for his estimate of population in the south a ratio of military forces to population, derived from European experience, which Davis thought was too high to be realistic in the circumstances

of India in the seventeenth century. Das Gupta (1972) added 35 million to Moreland's estimate for northern India alone, noting in addition to Davis' first observation that the nonagricultural population had been left out of account. If both Davis' and Das Gupta's amendments are accepted, the estimate of population in the region as a whole about 1600 is raised to approximately 150 million.

Estimates of India's population trend since 1600 according to several authors are charted in figure 2. Between 1600 and 1800, all estimates are conjectural interpolations representing different views of the probable demographic effects of outstanding political, economic, and military events. The latter half of the eighteenth century was an especially troubled period, with the struggles against the British, the Afghan invasions, and the tragic Bengal famine of 1770-1771. Only the estimates by Shirras which Willcox adopted indicate unabated growth of the population during this period. Datta postulated a rising trend of population between 1600 and the early 1700's, citing historical evidence of extension of cultivated lands, increasing trade, and increasing consumption of salt. Das Gupta (1972) agreed that the population might have increased during the first three-quarters of the seventeenth century, when the Mogul power in northern India was still strong, but allowed no further growth between 1675 and 1800. Davis assumed that the population was static between 1600 and 1750 and grew thereafter at a gradually accelerating rate.

Certainly India has been one of the world's most populous regions since long before the beginning of the Christian Era. It was recognized as such by the Greeks in Alexander's time, and archaeological data bear witness to the fact that a relatively large and dense population with urban centers was established in the Indus Valley two thousand years earlier. But the order of size of the population at the time of Christ and the form of the trend over the next sixteen

FIGURE 2. INDIA-PAKISTAN-BANGLADESH: POPULATION ESTIMATES  
SINCE THE SEVENTEENTH CENTURY A. D.



\* After Shirras (1933).

\*\* Midpoints of estimated ranges.



centuries remain in doubt. Das Gupta (1972, p. 425) stated cautiously, "It is possible that populations of the order of 100 millions were attained by India (within the present area of the Indian Union, not including Pakistan and Bangladesh) during the peaks of the country's ancient and medieval periods under Chandragupta Maurya (300 B.C.), Asoka, Chandra Gupta II Vikramaditya (A.D. 400), Harsha (A.D. 650), Akbar (A.D. 1600) and his immediate successors, with populations dwindling during the intervening unsettled periods". Pran Nath (1929) took a similar view, suggesting peak population levels in the range of 100-140 million in the region as a whole, and Davis (1951) was apparently willing to accept this. Clark (1968) likewise postulates a level long-range trend from the beginning of the Christian Era until 1500 but puts the level more conservatively in the range of 70-80 million. On the other hand, Russell's (1969) estimate of only 22-37 million in the seventh century implies a trend in India more like what the statistics indicate for China. Even if the upper limit of Russell's estimated range were raised by 50 percent, it would appear that the population doubled, more or less, between the seventh and seventeenth centuries. Either a trend of this form or one of no long-term increase in peak levels before the seventeenth century can be fitted into the indifference ranges shown in table 2.

Roman Empire.--Population estimates of the Roman Empire at the beginning of the Christian Era are on firmer statistical ground than those of India but not as firm as those of China. Although the Romans were inveterate census-takers and developed an elaborate system of statistical reporting as a part of their imperial administrative apparatus, surprisingly few records of their population statistics have been preserved. The most important record is that of the censuses of Roman citizens which were carried out from time to time between the sixth century B.C. and the first century A.D. From 130,000 in 508 B.C., the



recorded totals of citizens rose to 4,937,000 in A.D. 14 and 5,984,000 in A.D.<sup>1</sup>  
48. The figures for late years of the Republic and early years of the Empire have been used as principal ingredients of estimates of the population in Italy, where most of the citizens resided and where they undoubtedly made up a large fraction if not a majority of the population. Estimates of Italy's population around the beginning of the first century A.D. made on this basis range from about 6 million to more than 20 million, with different interpretations of the definition of the census figures (male citizens able to bear arms, adult males, males of all ages, or the citizen population of both sexes and all ages) and different assumptions about the proportionate shares of citizens, other freemen, and slaves in the total population. Provincial censuses were also taken during the early Empire period, some being limited to citizens while others apparently had a wider scope. References to these censuses are found in some of the Latin writings, citing numbers of citizens counted or population figures for certain provinces or cities. In general, the reliability of the figures is open to question and they fall far short of providing a general statistical conspectus of the empire's population. Historians have made estimates of the population of the empire and its parts by piecing together the fragments of statistics with historical and archaeological data such as reported size of armies, quantities of grain shipments and distributions, areas of cities, and indications of the extent and intensity of cultivation of lands.

Table 4 presents a selection of estimates of population in the Roman Empire under Augustus, early in the first century A.D., according to various authors. The disagreements illustrate the latitude which exists for different

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1

Brunt (1971) lists the numbers reported for 40 dates from 508 B.C. to A.D. 14 and discusses at length various interpretations of their definitions. See also Beloch (1886, p. 371).

Table 4. Roman Empire of Augustus: population estimates as of A.D. 0, 1, or 14

(millions)

|                                     | Beloch<br>1886 | Wright<br>1942 | Russell<br>1958  | Clark<br>1968    | Others            |
|-------------------------------------|----------------|----------------|------------------|------------------|-------------------|
| Total empire                        | 54.0           | 63.5           | 46.9             | 56.8             | <sup>c</sup> 80.0 |
| European part                       | 23.0           | 30.0           | 25.0             | 31.6             |                   |
| Italy (inc. Sicily and<br>Sardinia) | 7.1            | 6.0            | 7.4              | 14.0             | <sup>d</sup> 14.0 |
| Gaul                                | 4.9            | 6.5            | <sup>a</sup> 6.6 | <sup>a</sup> 6.6 | <sup>e</sup> 8-9  |
| Iberia                              | 6.0            | 6.0            | 6.0              | 6.0              | <sup>f</sup> 8.0  |
| Greece                              | 3.0            | 5.0            | 3.0              | 3.0              | -                 |
| Balkans and Danube Basin            | 2.0            | 6.5            | <sup>b</sup> 2.0 | <sup>b</sup> 2.0 | -                 |
| Asian part                          | 19.5           | 16.0           | 13.2             | 14.0             | <sup>g</sup> 17.5 |
| Asia Minor                          | 13.0           | -              | 8.8              | -                | <sup>h</sup> 13.0 |
| Syria                               | 6.0            | -              | 4.4              | -                | <sup>i</sup> 10.0 |
| Cyprus                              | 0.5            | -              | -                | -                | -                 |
| African part                        | 11.5           | 17.5           | 8.7              | 11.2             | <sup>g</sup> 14.5 |
| Egypt                               | 5.0            | 7.5            | 4.5              | 7.0              | <sup>j</sup> 9.0  |
| Cyrenaica and Province<br>of Africa | 6.5            | 10.0           | 4.2              | 4.2              | <sup>k</sup> 3.5  |

a

Including the Netherlands.

b

Apparently not including the Danube provinces.

c

Cavaignac (1935).

d

Frank (1940).

e

Cavaignac (1923), referring to the time of Caesar's conquest.

f

Vandellos (1934).

g

Meyer (1909), referring to A.D. 30.

h

Broughton (1938).

i

Heichelheim (1938), referring to a date not exactly specified, apparently in the first century A.D.

j

Walek-Czernecki (1938).

k

Gilbert Ch. Picard, La civilisation de l'Afrique Romaine (cited by Reinhard, Armengaud, and Dupaquier, 1968, p. 42).



interpretations of the data that are available. Beloch's estimates carry the authority of a scholar highly respected for his knowledge of the history of Roman and Greek antiquity, his careful work and judgment. His estimates published in 1886 for parts of the empire at the death of Augustus, A.D. 14, came to a total of 54 million which he bracketed in an error range of 50-60 million. Among the estimates made by other writers since the time of Beloch's work, only Russell's indicate a total of less than 50 million people in the empire of Augustus. Russell based his estimates chiefly on information about the areas enclosed within the walls of the principal cities and the dubious assumption of a uniform numerical relation between the population of a city and that of the area which it served as a center. The results of his calculations were far below Beloch's estimates of the population in the Asian and North African sectors of the empire. Several other authors also have proposed lower estimates than Beloch's for those parts of the empire, but some estimates for Egypt, Spain, Gaul, and especially Italy are considerably higher than Beloch's. Beloch himself in a later work (1899) increased moderately his estimates for Egypt, Gaul, and Italy. Some estimates of the total population of the empire in Augustus' time are well above Beloch's upper limit of 60 million. Cavaignac (1935) put it at 80 million. Clark's selection of estimates from Beloch's, Russell's, and other works implies a total of about 57 million.<sup>1</sup> For Italy, Clark preferred Frank's (1940) estimate of 14 million instead of Beloch's 7 million. Brunt (1971) agreed that Beloch had underestimated the population in Italy but argued that Frank's estimate was too high. An attitude of

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1

Russell's and Clark's tabulations of estimates do not give totals for the Roman Empire. The approximate totals obtained by summing their figures for pertinent areas, as shown in table 4, include areas outside Augustus' empire in the Netherlands and the western part of North Africa while excluding areas in the Danube Basin which were within the empire.



impartiality toward most of these estimates is reflected by the indifference ranges in table 2 for population estimates of the corresponding regions at the time of Christ.

There is more disagreement among historians about the trend of population in the Roman Empire during later centuries and its size at the apogee. In Beloch's opinion (1899), population was stationary or declining in Italy or Greece from the early years of the first century onward but it continued to increase in other parts of the empire during the next two or three centuries. He thought that the peak of population in the empire as a whole was probably reached about A.D. 200, at which time he estimated the total at about 100 million including the areas annexed after Augustus' death. Cavaignac (1935) doubled this figure. Russell, on the contrary, considering indications of shrinkage in the areas of cities, inferred that the population reached its maximum in the first century and was greatly reduced by the fourth century in the western parts of the empire.

Europe.--Estimates of the total population of Europe including Russia or the European part of the Soviet Union are charted in figure 3A for the period from the first to the seventeenth century A.D. and in figure 3B since the seventeenth century. Table 5 presents estimates for three regional divisions of the continent: western Europe (composed of Italy, Spain, Portugal, France, Switzerland, Belgium, Netherlands, the British Isles, and the Scandinavian countries), European Russia or the European part of the U.S.S.R., and the remainder of eastern and central Europe. Data for historical population estimates are much poorer, on the whole, in the latter regions than in the west.

Wright based his estimates for the period A.D. 1 to 1600 partly on Beloch's works (1900a, 1900b) but Wright went much further than Beloch was willing to venture in putting down figures where a solid basis was lacking and

FIGURE 3A. EUROPE, INCLUDING EUROPEAN RUSSIA: POPULATION ESTIMATES, A.D. 0-1650

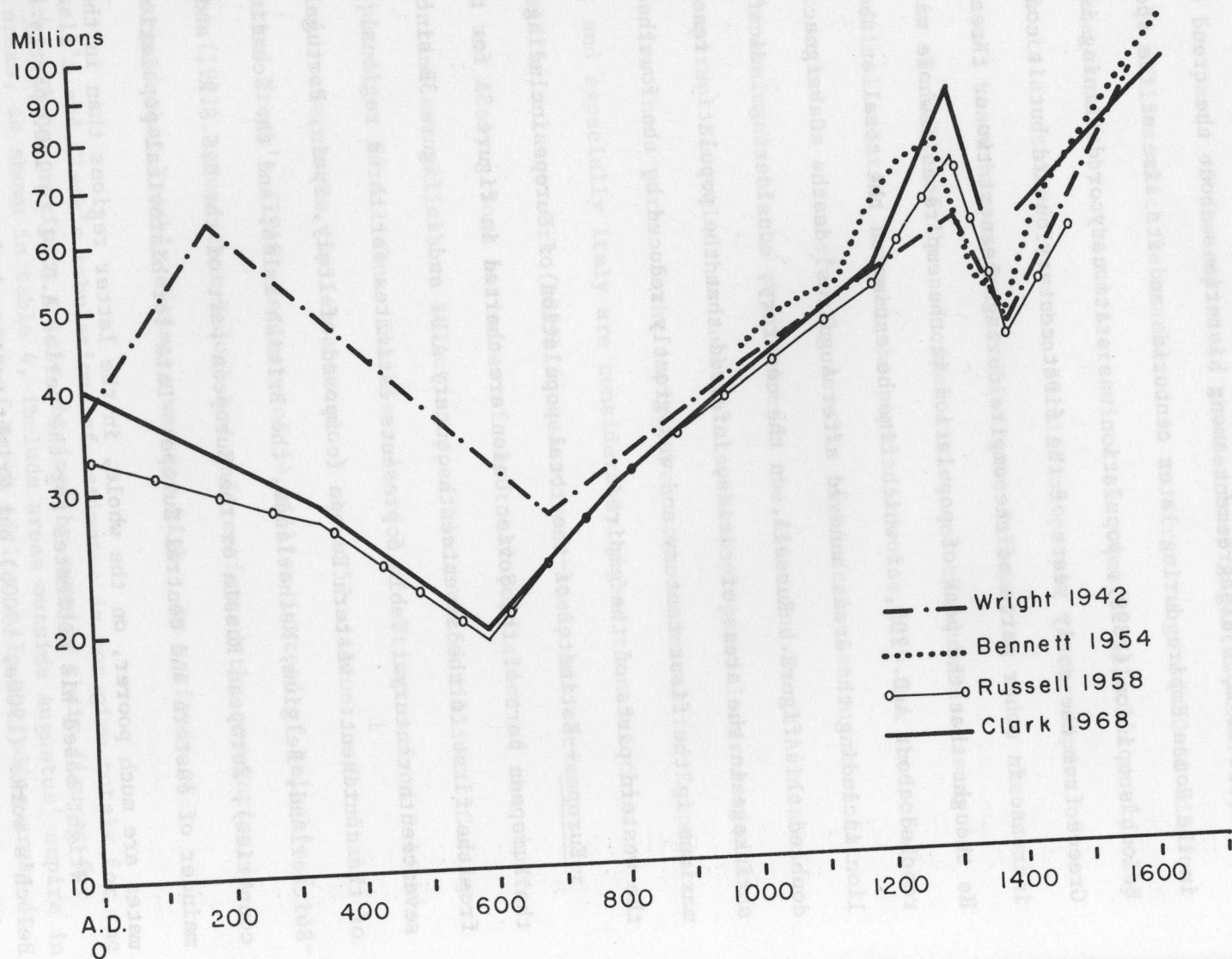


FIGURE 3B. EUROPE, INCLUDING EUROPEAN RUSSIA OR EUROPEAN PART OF THE U.S.S.R.:  
POPULATION ESTIMATES SINCE A.D. 1600

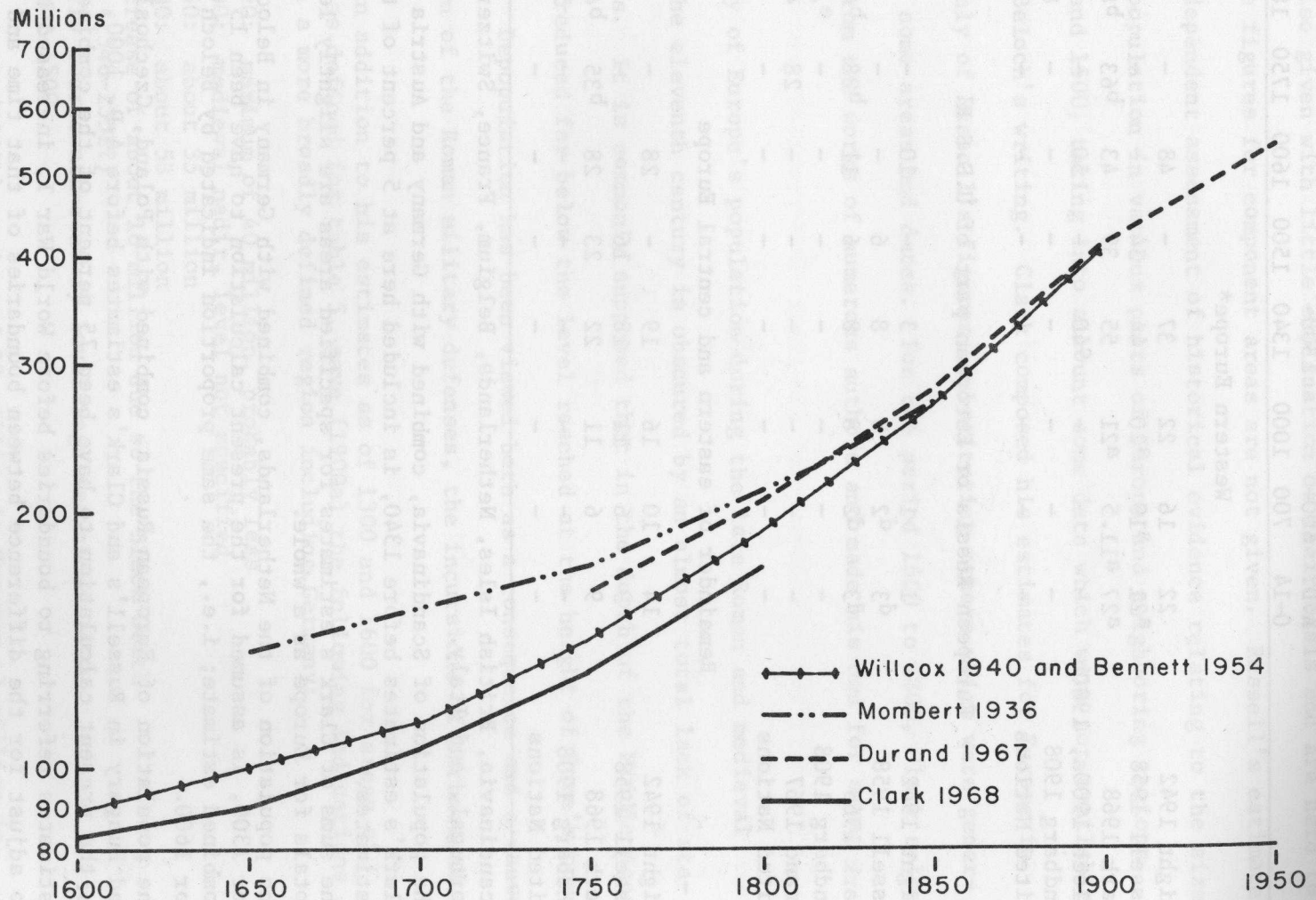




Table 5. Regions of Europe: population estimates since the beginning of the Christian Era

(millions)

|  | A.D.<br>0-14    | 600-<br>700       | 1000            | 1300-<br>1340   | 1500 | 1600 | 1750            | 1800            | 1900             | 1970 |
|--|-----------------|-------------------|-----------------|-----------------|------|------|-----------------|-----------------|------------------|------|
| Western Europe*                              |                 |                   |                 |                 |      |      |                 |                 |                  |      |
| Wright 1942                                  | 22              | 16                | 22              | 37              | -    | 48   | -               | -               | -                | -    |
| Russell 1958                                 | <sup>a</sup> 21 | <sup>a</sup> 10   | <sup>a</sup> 20 | 44              | 34   | -    | -               | -               | -                | -    |
| Clark 1968                                   | <sup>a</sup> 27 | <sup>a</sup> 11.5 | <sup>a</sup> 21 | 55              | 39   | 43   | <sup>b</sup> 63 | <sup>b</sup> 83 | -                | -    |
| Beloch 1900a, 1900b                          | -               | -                 | -               | <sup>c</sup> 40 | -    | 50   | -               | -               | -                | -    |
| Sundbärg 1908                                | -               | -                 | -               | -               | -    | -    | -               | 89              | 160              | -    |
| United Nations                               | -               | -                 | -               | -               | -    | -    | -               | -               | -                | 258  |
| European Russia or European part of U.S.S.R. |                 |                   |                 |                 |      |      |                 |                 |                  |      |
| Wright 1942                                  | 1               | 1                 | 2               | 3               | -    | 10   | -               | -               | -                | -    |
| Russell 1958                                 | <sup>d</sup> 3  | <sup>d</sup> 2    | 8               | 8               | 6    | -    | -               | -               | -                | -    |
| Clark 1968                                   | <sup>d</sup> 3  | <sup>d</sup> 2    | 8               | 8               | 6    | 11   | <sup>b</sup> 28 | <sup>b</sup> 40 | -                | -    |
| Sundbärg 1908                                | -               | -                 | -               | -               | -    | -    | -               | <sup>e</sup> 41 | <sup>e</sup> 115 | -    |
| Durand 1967                                  | -               | -                 | -               | -               | -    | -    | 28              | 43              | 110              | -    |
| United Nations                               | -               | -                 | -               | -               | -    | -    | -               | -               | -                | 183  |
| Remainder of eastern and central Europe      |                 |                   |                 |                 |      |      |                 |                 |                  |      |
| Wright 1942                                  | 14              | 10                | 16              | 19              | -    | 28   | -               | -               | -                | -    |
| Russell 1958                                 | 9               | 6                 | 11              | 18              | 16   | -    | -               | -               | -                | -    |
| Clark 1968                                   | 9               | 6                 | 11              | 22              | 23   | 28   | <sup>b</sup> 35 | <sup>b</sup> 44 | -                | -    |
| Sundbärg 1908                                | -               | -                 | -               | -               | -    | -    | -               | 59              | 125              | -    |
| United Nations                               | -               | -                 | -               | -               | -    | -    | -               | -               | -                | 206  |

\*Scandinavia, British Isles, Netherlands, Belgium, France, Switzerland, Spain, Portugal, and Italy.

<sup>a</sup>The population of Scandinavia, combined with Germany and Austria in Russell's and Clark's estimates before 1340, is included here at 5 percent of their combined estimates.

<sup>b</sup>The sums of Clark's estimates for specified areas are slightly less than his totals for Europe as a whole.

<sup>c</sup>The population of the Netherlands, combined with Germany in Beloch's estimates for 1300, is assumed for the present calculation to have been 15 percent of the combined estimate; i.e., the same proportion indicated by Beloch's estimates for 1600.

<sup>d</sup>The population of European Russia, combined with Poland, Czechoslovakia, etc., and Hungary in Russell's and Clark's estimates before A.D. 1000, is assumed for the present calculation to have been 75 percent of the combined estimates.

<sup>e</sup>Estimates referring to boundaries before World War I, increased by 15 percent to adjust for the difference between boundaries of that time and present boundaries.

he did not explain how he obtained the figures not given by Beloch. Bennett's estimates of the population in Europe as a whole at fifty-year intervals since A.D. 1000 are also given with little explanation of their basis and are hard to evaluate because figures for component areas are not given. Russell's estimates represent an independent assessment of historical evidence relating to the size and changes of population in various parts of Europe and neighboring regions between A.D. 1 and 1500, taking into account some data which were not available at the time of Beloch's writing. Clark composed his estimates for Europe in this period mainly of Russell's figures, substituting others which were generally higher for some areas and dates. For the period 1600 to 1800, Clark selected estimates from the works of numerous authors and made his own for some countries.

The history of Europe's population during the late Roman and medieval periods up to the eleventh century is obscured by an almost total lack of statistical records. It is commonly supposed that in the depth of the Middle Ages, population was reduced far below the level reached at the height of Rome's power and prosperity. Depopulation has been viewed both as a consequence and a cause of the breakdown of the Roman military defenses, the incursions of barbarians,

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Beloch, in addition to his estimates as of 1300 and 1600 for areas of western Europe as defined for table 5, gave (1900a) the following indications of the trend in a more broadly defined region including Germany:

- A.D. 200: maximum of 40 million, probably less
- 700: medieval nadir, level not specified
- 1050: about 35 million
- 1300: about 53 million
- decrease of about 10 million due to the Black Death (1348-1352?)
- early fourteenth-century level regained about 1400 or 1500.

In 1600, Beloch (1900b) estimated 20 million in Germany, 3 million in Poland and Prussia, and a round figure of 100 million in all Europe including Russia.



the loss of peace and security, the decline of cities and trade, and the reversion toward a locally self-sufficient economic and political organization. Epidemics, especially the continent-wide conflagration of plague in the sixth century, are also believed to have been an important cause of population decline. Wright's, Russell's, and Clark's estimates (figure 3A) agree in indicating large population losses during the late Roman and early medieval centuries, not only in the Roman areas but generally in other regions of Europe as well, although they differ as regards the size of population at the Roman apogee, the date of onset of the decline, and the date and level of population at the medieval nadir. However, the fact of large, widespread depopulation has not been definitely established.

Certainly the western part of the empire was progressively deurbanized from the third century onward and urbanization sank very low by the seventh and eighth centuries everywhere in Europe except the Byzantine realm. These facts are demonstrated unequivocally by the archaeological evidence of shrunken areas enclosed by the walls of late Roman and early medieval cities and towns, which Russell used as an important part of the basis for his population estimates. But as Lot (1945) observed, the decrease of urban population may have been less than proportionate to the shrinkage of urban areas, and more important, it does not necessarily imply a parallel decline of rural population. On the contrary, archaeological excavations and aerial photography in parts of the former Roman Empire in Europe have revealed no evidence of a general trend of diminishing number or size of rural settlements or retrenchment of cultivated areas during the periods in question (Heichelheim, 1956). Russell postulated approximately a 40 percent loss of population in Europe as a whole during the second half of the sixth century as a result of the so-called Justinian's plague and its recurrences, but this is purely hypothetical. The 40 percent was Russell's estimate



(itself questionable) of the depopulation caused by the plague epidemics in the fourteenth century, and he supposed (1958, pp. 41-42) that the proportion would probably have been about the same in the sixth century.

Since the beginning of the second Christian millenium, the major outlines of the trend of Europe's population are more definitely known. The eleventh, twelfth, and thirteenth centuries witnessed considerable growth of population in western and central Europe, continuing on an enlarged scale a trend which seems to have been proceeding unsteadily during several earlier centuries. There was a set-back in the fourteenth century, when almost all Europe and much of Asia and northern Africa as well were stricken by the great plague pandemic of 1348-1350 known as the Black Death, and recurrent outbreaks of plague sapped Europe's demographic vitality during several following decades. Growth resumed in the fifteenth and sixteenth centuries; slackened in the seventeenth, when renewed attacks of plague, wars, and economic troubles brought losses of population to several countries in western and central Europe; and gathered increasing momentum after the middle of the eighteenth century as the European nations entered the modern Industrial Age. These phases of the trend over the last millenium are marked clearly in the various series of estimates, especially for western Europe. However, the estimates disagree with regard to the speed and volume of increases during the periods of growth, the amount and duration of the depopulation caused by the plagues in the fourteenth century, and the levels of population reached in successive phases of the trend prior to the last century or two.

A considerable increase of population in western and central Europe during the eleventh, twelfth, and thirteenth centuries is indicated by various kinds of historial evidence such as the establishment of new settlements, clearing of woodlands, drainage of swamps and diking of polders, conversion of pastures and

heaths to cropland, substitution of more labor-intensive for less intensive methods of land use, and growth of urban centers and trade. While these indications, taken together, leave little room for doubt about the fact of population growth, the amount of growth remains uncertain. Only in England, the famous Domesday Book of 1086 furnishes a substantial, although imperfect, statistical basis for an estimate of size of the population near the beginning of this period and no such basis for an estimate near the end of the period exists in this case. The next benchmark for England is the record of the poll tax collected in 1377, after the ordeal of the Black Death and several subsequent epidemics of plague. For France, the record of the hearth tax of 1328, two decades before the Black Death, serves as a basis, again imperfect, for a population estimate near the end of the growth period in question, but in this case there is no firm foundation for an estimate near the beginning. The problem is similar in the cases of Italy and Spain. Elsewhere, in Germany and the Scandinavian countries for example, there are few quantitative records to indicate the size of the population at any date within this period. For eastern Europe, information is poorer both as regards the size and the trend of the population. However, the political and economic history of the tottering Byzantine Empire and the nascent Russian nation does not suggest that they shared much, if at all, in the trend of population growth during these centuries.

In the case of England, where the data base is relatively good, the uncertainty as regards the amount of population increase between the eleventh and fourteenth centuries and the level reached at the peak before the stroke of the Black Death is illustrated by the following comparison of Beloch's and Russell's estimates:

## Population of England

|                   | According to<br>Beloch, 1900a | According to<br>Russell, 1948 |
|-------------------|-------------------------------|-------------------------------|
| 1086.....         | 1,500,000                     | 1,100,000                     |
| 1340 or 1348..... | about 2,750,000 <sup>1</sup>  | 3,757,500                     |
| 1377.....         | 2,600,000                     | 2,250,000                     |

The main source of uncertainty in estimates of England's population in 1086 derived from the data in Domesday Book is that only the numbers of households on the manorial estates, and not the numbers of persons, are given. Russell assumed an average of 3.6 persons per household whereas Beloch put the average at 5.0, intentionally somewhat high to compensate for presumed omissions in the record of households. Both figures are within the range of variations indicated by the scanty information about average sizes of households in medieval European populations. (Russell, 1958, pp. 47-59, reviews some relevant data.) In population estimates derived from the record of the 1377 poll tax, which was levied on individuals over 14 years of age at the rate of 4d. per head, the main question is, how many were exempt or managed to evade the tax? Beloch assumed a 20 percent rate of exemptions and evasions; Russell allowed 2 1/2 percent. Both estimates of the population in 1340 or 1348 were obtained by backward projection from the 1377 estimates, with very different estimates of the effect of the plagues. Beloch thought that only the initial epidemic which struck in 1348 caused a major loss of population and that most of the loss was recuperated by 1377. Russell attempted to calculate the population trend by means of mortality and replacement rates in successive generations derived from

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Beloch did not give a specific estimate of England's population but he suggested that it was slightly larger than the number in 1377 and estimated about 4,000,000 in the whole of the British Isles in the early fourteenth century. The figure of 2,750,000 for England in 1340 or 1348 is consistent with these indications.



records of inquests post mortem on the inheritance of crown estates. According to his estimates, after a sharp decrease in 1348-50, England's population continued to diminish under the impact of recurrent epidemics through the rest of the fourteenth century, dropping by 1377 to 60 percent of the number in 1348 and coming to a nadir slightly above 2 million in 1400-1430.<sup>1</sup>

There have been many studies of the demographic effects of the Black Death and subsequent plague epidemics in various parts of Europe, based mainly on local records of population or households registered in certain cities, towns, or rural districts in pre-plague and post-plague years. The reliability of indications of mortality derived from such records is questionable in many instances because depopulation of plague-stricken areas may often have been brought about in large part by outmigration of fugitives. Moreover differences between numbers of households listed on tax registers in pre-plague and post-plague years might often give distorted indications of the changes in population since the mortality and the migrations associated with the epidemics could affect significantly the composition and average size of households and possibly the proportion of households exempt from registration and taxation on account of economic handicaps. Nevertheless, the results of historical studies based on such data make it apparent that mortality due to these epidemics varied widely from place to place, so that it is difficult to derive reliable estimates for countries or regions from scattered local data. In spite of the diversity of local experiences, Russell took his estimate of a population loss of approximately 40 percent in England between 1348 and 1400 to represent a standard applicable to the whole of Europe and neighboring regions afflicted by the

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<sup>1</sup>Russell's calculations have been revised by Hollingsworth (1969, pp. 375-388), who estimated the population at 2.5 million in 1225, 3.65 million in 1348, 2.25 million in 1377, and only 1.17 million at a nadir in 1444. Postan (1972, pp. 27-31) reviews the factors of uncertainty and concludes that the evidence will not support meaningful estimates for 1086, 1377, and the trend during the interval.

fourteenth-century plagues (and, as already mentioned, those of the sixth century as well), except zones of dry, warm climate, where he thought the mortality was lighter. Wright, following Beloch's lead, estimated more conservatively a 25 percent loss in Europe's total population between 1328 and 1400. Shrewsbury (1970) argued that very high ratios of depopulation in rural districts over wide regions were incredible in view of limiting factors inherent in the aetiology and epidemiology of plague.

Moving on to the fifteenth, sixteenth, and seventeenth centuries, we find population estimates for the western region of Europe more firmly grounded than before on Grade B statistical records. However, gaps in the data and uncertainty about the multipliers applicable to statistics of households or limited categories of the population still leave a good deal of room for doubt about the size and changes of population in the western countries during these centuries, while data for the central and especially the eastern countries remain distinctly poorer on the whole. The series of estimates compared in figure 3A and table 5 agree in indicating substantial increases of population between 1500 and 1700 throughout Europe except in Spain, although temporary halts or reversals are indicated in Italy, France, and Germany. There is disagreement as regards the amounts of increase and the levels of population reached during this period compared with the peak prior to the plagues in the fourteenth century. According to Russell's estimates, the population in 1500 equalled or surpassed the level of 1340 only in the Balkans, Hungary, and the Slavic countries except Russia. Clark's estimates (considerably higher than Russell's as of 1500 for Italy, Germany, and other central European countries) have Europe's total population regaining the 1340 level about 1600, while Wright's estimates indicate a gain by 1600 of about 30 percent above the total in 1328.

A question of special interest is the trend of Europe's population during



the early stages of modern economic development, in the eighteenth and early nineteenth centuries, and how it compared with contemporary trends in other parts of the world. For Europe, measures of population and its growth during that period are still inexact; only since about 1850 for western and central Europe and about 1900 for Russia and the rest of the eastern region do the records of censuses and vital statistics provide the basis for estimates within very narrow ranges of possible error. The different series of estimates charted in figure 3B indicate the following growth rates of Europe's total population during successive periods since 1650:

Europe, including European Russia: annual  
average rates of population increase per 1,000

|           | Willcox<br>1931,<br>1940 <sup>1</sup> | Mombert<br>1936 | Durand<br>1967   | Clark<br>1968    |
|-----------|---------------------------------------|-----------------|------------------|------------------|
| 1650-1750 | 3.4                                   | 2.4             | -                | 3.7              |
| 1750-1800 | 5.9                                   | 4.0             | 4.4              | 5.7              |
| 1800-1850 | 6.9                                   | 4.6             | 6.1              | 8.6 <sup>2</sup> |
| 1850-1900 | 8.2                                   | 8.2             | 7.8              | -                |
| 1900-1950 | -                                     | -               | 5.4              | -                |
| 1950-1970 | -                                     | -               | 9.6 <sup>3</sup> | -                |

Mombert criticized Willcox's estimates on the ground that they made too little allowance for defects in the early census enumerations and vital statistics and consequently exaggerated the growth of Europe's population during the early decades of the nineteenth century and especially before 1800. Mombert's estimates, in which he attempted to correct this bias, indicate a more pronounced

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1

Estimates accepted by Bennett (1954) and Carr-Saunders (1936).

2

Rate calculated by relating Clark's estimate for 1800 to Willcox's for 1850.

3

Rate calculated by relating my estimate for 1950 to the United Nations estimate for 1970.



acceleration of growth in 1750-1800 as compared with 1650-1750 and again in 1850-1900 as compared with 1750-1850. My estimates (1967) are intermediate between Willcox's and Mombert's. Clark's series ends in 1800 with a European population total considerably below the level estimated by Willcox and others. (See the comparison with Sundbärg's estimates in table 5.) Relating Clark's estimate for 1800 with the fairly well established figures for 1850 and 1900, one obtains a picture of almost equally rapid population growth in the continent as a whole during 1800-1850 and 1850-1900, which is not easily reconciled with historical data on the trends of birth and death rates in European countries over the nineteenth century.

Northern Africa and Southwestern Asia.--Some parts of these two regions are unquestionably much less populated at present than they were in ancient times and it may be true, as Clark's estimates (table 1) indicate, that the total population in both regions was much smaller at the beginning of the modern period than it has been at the time of Christ. This is by no means certain, however. Estimates of population in the African and Asian provinces of the Roman Empire in the first century A.D. differ considerably, as the examples in table 4 show, and estimates for the parts of Southwestern Asia beyond the Roman frontiers are free to range very widely, untrammelled by statistical records. The levels of population in early modern times also are uncertain. Firm census benchmarks have been established only during the present century in most of the North African and Southwest Asian countries and are still lacking at present in some of them (notably Afghanistan, Saudi Arabia, and Yemen.) Reconstructions of population trends in these regions between ancient and modern times are in large measure conjectural.

For Egypt, Clark linked Johnson's (1938) estimate of the population in the first century A.D. with Russell's (1958) series from A.D. 600 to 1500 and

an estimate around 1800 derived from a survey made by a member of Napoleon's staff. The population is shown as decreasing by about two-thirds between A.D. 14 and 600 and oscillating in the low range of 2-3 million from 600 to 1800. The first census in the modern period, taken in 1821, agreed with the Napoleonic estimate of 2.5 million about 1800, but there is reason for suspecting that this was a gross understatement. The census of 1882 counted 6.8 million and omissions in its enumeration have been estimated conservatively at 700,000 (Kiser, 1944). So, if a more conservative estimate than Johnson's for the population at the beginning of the Christian Era were adopted, it would not be assured that the number was smaller in 1800.

Russell (1966) made a new series of estimates of Egypt's population between the seventh and sixteenth centuries based on records of poll taxes, land taxes, and cadastral surveys which required some dubious assumptions for translation into numbers of people. According to these estimates, linked with Russell's 1958 estimates for A.D. 1 and 350, the population decreased irregularly from 4.5 million at the time of Christ to a nadir slightly above 1.5 million in the tenth and eleventh centuries, then climbed steeply to a peak slightly above 4 million about 1300 and fell back to about 2.5 million in 1500. Other estimates of the level and trend of the Egyptian population in this period disagree violently. Hollingsworth (1969, p. 311) was not abashed to present a chart of estimates drawn from various sources which showed peaks of 30 million just before the plague in the sixth century and over 20 million in the eleventh century, and low points of about 7 million in the second century and hardly more than 2 million in 1750.

Data for historical estimates of population in the rest of Northern Africa are less abundant than those for Egypt. Clark's estimates for this region, drawn from Russell's (1958) work for dates up to 1500, follow a trend



approximately parallel to that of his estimates for Egypt. Information with regard to the former Roman territories in Southwestern Asia is not a great deal more satisfactory. Records of hearth taxes and poll taxes in the Ottoman Empire from the fifteenth century onward are potentially valuable materials for population estimates; in fact, Russell (1960) has made estimates on that basis for Greece and the Balkans about 1500, but gaps in the published records for areas in Asia Minor and Syria discouraged him from attempting to do the same with reference to those parts of the Ottoman domain. Russell's (1958) estimates for Asia Minor and Syria, which Clark adopted, were projected over the period A.D. 1 to 1500 assuming losses by the plagues in the sixth and fourteenth centuries at Russell's standard rate of 40 percent for Asia Minor and 10 percent for Syria (on account of the dry climate), and nearly constant numbers in the intervals. In 1500, according to these estimates, the population of the region was down to slightly more than half of the first-century level.

Mesopotamia at the beginning of the Christian Era was undoubtedly one of the world's most densely populated countries and there were also certainly a good many millions at that time in the present areas of Iran, Afghanistan, and the countries of the Arabian peninsula, but one can only guess how many. Mesopotamia must have been considerably depopulated in the thirteenth and fourteenth centuries, following the Mongol invasion, the decay and destruction of the irrigation system in the lower part of the valley, and the ravages of the plague. More than one historian has presumed that the population in Iran as well as Mesopotamia was considerably greater in ancient times than it was at the beginning of the modern period. On the strength of an assertion by Usher (1930) that "full settlement" was reached in this part of the world either under the Seleucid Dynasty (311-129 B.C.) or at the latest under the Sassanid Dynasty (A.D. 229-628), Putnam (1953) estimated the population at 20 million in the region of non-



Roman Southwestern Asia at the time of Christ, noting that this estimate was "a most uncertain maximum". Clark accepted this figure for the population of this region in A.D. 14 and an estimate of only 6 million in 1800 by Bonne (1942). He filled in estimates for intervening dates by interpolation on a trend approximately parallel with that of the estimates for Asia Minor and Syria. This construction is patently a fragile one.

If, in 1800, there were no more than 13 million people in the whole of Southwestern Asia and 5 million in Northern Africa, as Clark's estimates indicate, population must have increased at remarkably high rates during the next century to reach the estimated 1900 levels of 38 million in the former region and 27 million in the latter (table 1). The average annual growth rates implied by these estimates and corresponding figures for 1950 and 1970 are compared below with the rates derived from my estimates (1967) for Europe:

Annual increases per 1000

|                        | 1800-1900 | 1900-1950 | 1950-1970 |
|------------------------|-----------|-----------|-----------|
| Southwestern Asia..... | 10.7      | 9.5       | 26.2      |
| Northern Africa.....   | 16.9      | 8.8       | 26.3      |
| Europe.....            | 7.3       | 5.4       | 9.6       |

Death rates in Southwestern Asia and Northern Africa were undoubtedly high in the nineteenth century and were reduced considerably between 1900 and 1950. In the circumstances, it hardly seems plausible that population should have grown much more rapidly between 1800 and 1900 in these regions than it did in Europe. It is still less plausible that Northern Africa's growth rate should have been higher during 1800-1900 than it was during 1900-1950. A presumption of understatement in Clark's estimates of the 1800 population in these regions is indicated. In the case of Egypt, other reasons for suspecting understatement in

the estimate for 1800 were noted above. There are indications of a similar bias in early census enumerations and pre-censal population estimates for countries in other parts of the world. Estimates obtained by projecting backward from more recent and more reliable benchmarks may be preferable in many instances. My estimates (1967) made in this way for Northern Africa in 1800 are in the range of 6 to 18 million, and for Southwestern Asia, 16 to 41 million.

Japan.--Among the remaining regions of the Old World listed in table 1, it is for Japan that the estimates have the firmest foundation. The Japanese censuses and vital statistics provide a highly accurate record of the population since 1920 and estimates within fairly narrow margins of error between 1872 and 1920. (Taeuber, 1958, p. 41 lists estimates annually from 1875 to 1919.) The statistics of the Tokugawa registration of commoners between 1726 and 1852 (which Taeuber lists, *ibid.*, p. 22) are also believed to be fairly reliable although they do not include the nobility, samurai, and some other relatively minor groups. Population totals derived from the statistics of this period with estimates of the excluded groups are unlikely to be off the mark by more than a million or two. Statistics of Japanese population registrations in some earlier periods as far back as A.D. 610 are on record (*ibid.*, pp. 9ff.) but their reliability is even more dubious than that of the contemporary Chinese statistics. Taeuber (1958, pp. 14, 20) lists the following estimates made by Japanese scholars using the population registration data together with records of land redistributions in some localities, numbers of towns and villages, and amounts of the rice crops:

Population of Japan  
(millions)

|                |       |
|----------------|-------|
| A.D. 610.....  | 5 (?) |
| 823.....       | 3.7   |
| 859-922.....   | 3.8   |
| 990-1080.....  | 4.4   |
| 1185-1333..... | 9.75  |
| 1572-1591..... | 18.   |



These figures can only be taken as rough approximations. Clark's estimate of 2 million people in Japan at the beginning of the Christian Era is a mere conjecture. At that time (Yayoi period), the Japanese were neolithic or early bronze-age farmers and fishermen. It may be taken for granted that a considerable proportionate increase in the population went with the development, under Chinese influence during the early Christian centuries, of the literate and urbanized civilization which flowered in the Nara period (eighth century).

U.S.S.R. in Asia.--For the Asian part of the U.S.S.R., the estimate of approximately 5 million which Clark cites to represent the population during the first to the ninth century A.D. was made by Russell, using statistics for some areas within this region which were reported in the Han Dynasty censuses of the Chinese empire. Considering that the 1897 census of the Russian empire reported only 7 million in the Asian territory, Clark assumed that the population was nearly stationary in the range of 5 to 6 million from A.D. 14 to 1800. On the contrary, Lattimore (1940) postulated cycles of population growth in this region, related to variations of climate, to which he imputed an important role in provoking the periodic irruptions of Central Asian pastoral peoples into the farming regions of China, Southwestern Asia, and Europe. The possibility is suggested that the population in this region, as in China and Europe, expanded considerably during the centuries immediately preceding the vast imperial conquests by the Mongol Khans in the thirteenth and fourteenth centuries.

Southeastern Asia.--The demography of Southeastern Asia in past centuries is obscure. Statistical records are all but completely lacking prior to the colonial period and the earlier history and archaeology of the region have been studied less exhaustively than those of India, China, and the Middle East. Putnam (1953), explaining the derivation of his population estimates for world regions at the beginning of the Christian Era, noted laconically with reference



to Southeastern Asia, "No data available--5 million assigned." Clark took this figure to represent the population in A.D. 14 of "Other East Asia" (in the nomenclature of table 1, "Remainder of Asia, exc. U.S.S.R.," which includes Ceylon and Korea) and interpolated between this and an estimate of 40 million in 1800 to obtain the figures for intermediate dates. It seems possible that the resulting series of estimates may be understated. Five million people in this region at the beginning of the Christian Era would mean an average density of approximately one person per square kilometer. (The estimate of 2 million in Japan, where the economy was in a relatively primitive state of development, implies a density of more than 5 per km.<sup>2</sup>.) Much of Southeastern Asia at that time was little developed and sparsely populated, no doubt, but there were some areas of intensively developed agriculture and high civilization. Bielenstein's map (1947) of the population recorded in the Chinese census of A.D. 2 shows approximately 1 million in areas now within northern Viet Nam. There were significant numbers also in Korea, Ceylon, and the outposts of Indian civilization in Burma, Cambodia, and Java. The population in ancient Ceylon at its height (13th century A.D. ?) numbered about 7 million according to Sarkar's (1957) "moderate" estimate. This would be more than one-half of Clark's total for "Other East Asia" about that time. The estimate of 40 million for the region in 1800 compared with 120 million in 1900 (table 1) implies the relatively high average annual growth rate of 11 per 1,000 in the nineteenth century. A higher 1800 estimate and a lower growth rate would seem more plausible.

Tropical Africa.--Africa below the northern tier of countries is the region where the foundations of historical population estimates are least secure. Clark's estimate of 731 million people in the world of 1750 could easily be too high or too low by 30 million on account of error in the component for this region alone. Clark followed the lead of Willcox (1931, 1940) in putting

the total population of Africa, including the northern region, at a round figure of 100 million over the period from 1650 to 1800 (also 1850 in Willcox's series), for lack of data to support any more exact estimates. It is small assurance that Willcox found the same round number of 100 million representing Africa in a world population estimate made by the seventeenth-century Jesuit scholar, Riccioli, who could have had little information about conditions in much of tropical Africa in his time. Carr-Saunders (1936) reduced Willcox's estimate to 95 million in 1750 and 90 million in 1800 as an allowance for the effect of the slave trade, and let it rise again to 95 million in 1850.

The positive as well as the negative effects of the European intrusions into tropical Africa must be considered in an attempt to estimate the trend of population in this region during the last five centuries. African agriculture was greatly enriched by the new food crops which the Europeans brought from America. The greatest boon was manioc, which gave larger and steadier yields than traditional crops afforded under the conditions prevailing in much of tropical Africa and could be grown on lands previously of little value for agriculture. Manioc spread very widely in the region during the sixteenth and seventeenth centuries and became the principal food staple in many parts of tropical Africa during the eighteenth and nineteenth centuries (Jones, 1959, chapter 3). The increasing cultivation of manioc, maize, and other new crops may be viewed both as a response to the demand of an increased population and as a stimulus to demographic expansion.

The direct contribution of European immigration to the growth of Africa's population was relatively small. This became numerically significant only in South Africa during the nineteenth and twentieth centuries. Another minor contribution was the importation of Asian laborers into South and East Africa during that period.

On the negative side, while the slave trade undoubtedly caused depopulation of some areas, especially in parts of West Africa, the importance of its effect on the population trend in tropical Africa as a whole is questionable. According to Curtin's estimate (1969, p. 270), about 9 1/2 million African slaves were imported into America and parts of the Old World between 1451 and 1870 and approximately 6 million of these were imported between 1701 and 1810. For a liberal estimate of the demographic loss to Africa, suppose that these numbers should be doubled to allow for possible underestimation of the imports, the mortality of slaves in transit, and deaths and birth deficits caused by the slave raiding and disruption of families and communities in the areas from which the slaves were abducted. Even so, the loss due to the slave trade at its height during the eighteenth century would have been only about 120,000 a year or an annual rate of less than 0.25 percent in the population of Tropical Africa as a whole if this population was not less than 50 million. No high rate of natural increase would have been needed to overbalance such a loss.

Another negative influence may have been diseases brought by the Europeans to Africa. In America, diseases of European origin to which the aboriginal peoples had had no previous exposure caused enormous mortality during the sixteenth and seventeenth centuries. Although there is little information about the epidemiological repercussions of early European contacts in Tropical Africa, one may surmise that the consequent mortality in this region was not negligible, but much less disastrous than what America suffered. The negative influence of this factor upon the population trend would presumably have been strongest during the fifteenth and sixteenth centuries.

On the balance, an increasing trend of population in the "Remainder of Africa" throughout the last five centuries appears more plausible than Willcox's assumption of a constant level from 1650 to 1850 or Carr-Saunders'



assumption of a decline between 1650 and 1800. Relatively slow growth before the nineteenth century and a quickening rate in more recent times are suggested. A backward projection from a United Nations estimate for 1920 assuming annual average growth rates of 1.0 percent during 1900-1920, 0.5 percent during 1850-1900, and 0.25 percent during 1750-1850 yields an estimate of 54 million inhabitants in the "Remainder of Africa" in 1750 (Durand, 1967). If this Grade D projection is carried on back with an annual growth rate of 0.25 percent between 1500 and 1750, the result is an estimate of about 30 million in 1500. Indifference ranges of 50-80 million for 1750 and 30-60 million for 1500 are suggested in table 2.

At the beginning of the Christian Era, Putnam (1953) "assigned" 10 million people to Africa outside the Roman frontiers, noting that no data were available. This implies an average density of about 1 person per 2 square kilometers. Clark, citing Putnam as his authority, raised the number to 12 million without comment. Bennett (1954), faced with the problem of choosing figures to represent Africa in his series of world population estimates beginning in A.D. 1000, put the continental total for that date at 50 million and raised it progressively at 50-year intervals to 90 million in 1600. Bennett justified the near doubling of the estimate over this period of six centuries on the ground that agricultural peoples were spreading out from East Africa and the Bend of the Niger, pushing aboriginal Bushman hunter-gatherers south and west and pygmies into the central highlands. Clark accepted Bennett's estimates for this period with a minor adjustment. According to another view, Africa's population remained unchanged between A.D. 1000 and 1650, as gains in the east and south were balanced by losses in the west (United Nations, 1973, p. 19). The indifference ranges of population estimates for the "Remainder of Africa" in A.D. 0 and 1000 shown in table 2 imply relatively slow growth during A.D.

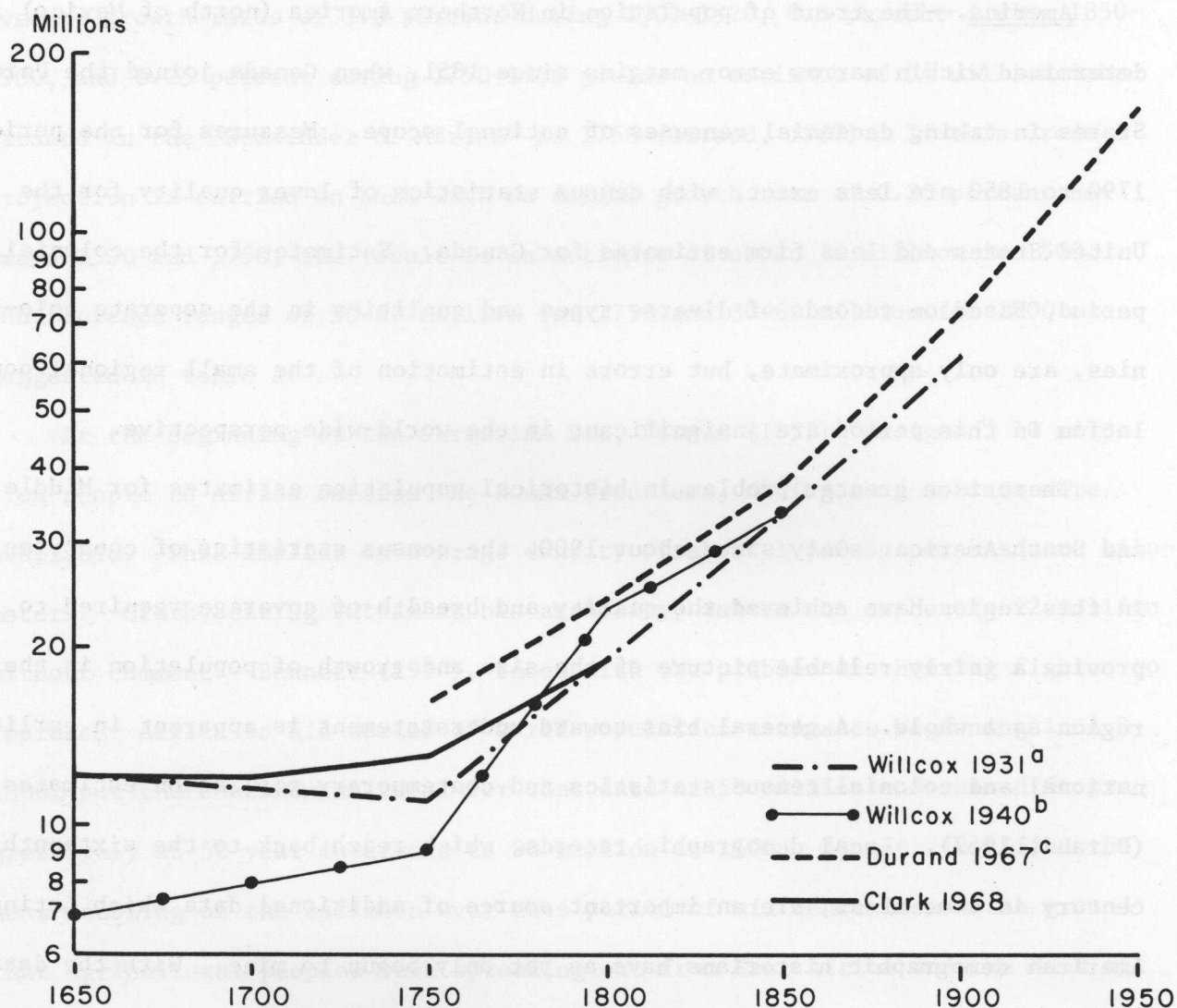
0-1000 and 1000-1500 and a somewhat higher average population density than Putnam guessed as of A.D. 0. The highly speculative and hypothetical character of these estimates should be underlined.

America.---The trend of population in Northern America (north of Mexico) is determined within narrow error margins since 1851, when Canada joined the United States in taking decennial censuses of national scope. Measures for the period 1790 to 1850 are less exact, with census statistics of lower quality for the United States and less firm estimates for Canada. Estimates for the colonial period, based on records of diverse types and qualities in the separate colonies, are only approximate, but errors in estimation of the small regional population in this period are insignificant in the world-wide perspective.

There is a greater problem in historical population estimates for Middle and South America. Only since about 1900, the census statistics of countries in this region have achieved the quality and breadth of coverage required to provide a fairly reliable picture of the size and growth of population in the region as a whole. A general bias toward understatement is apparent in earlier national and colonial census statistics and contemporary population estimates (Durand, 1967). Local demographic records, which reach back to the sixteenth century in some areas, are an important source of additional data which Latin American demographic historians have as yet only begun to mine. With the data available at present, the growth of population in this region during the nineteenth century can only be estimated approximately and only a vague outline of the trend over the three preceding centuries can be drawn. The size of the population at the time of Columbus' voyages and its trend during earlier centuries are highly uncertain.

Four series of estimates of population in the Middle and South American region since 1650 are charted in figure 4. Two series of estimates by Willcox

FIGURE 4. MIDDLE AND SOUTH AMERICA: POPULATION ESTIMATES  
SINCE A.D. 1650



<sup>a</sup> Estimates accepted by Carr-Saunders (1936).

<sup>b</sup> Figures obtained by reclassifying Willcox's estimates, which gave totals for North America (including Middle America) and South America.

<sup>c</sup> "Medium" estimates. 1950 and 1970 figures are United Nations estimates.



are included: his original estimates (1931), which Carr-Saunders (1936) accepted for this region, and his revised estimates (1940). The original estimates indicate that the current trend of rapid population growth in Middle and South America began during the second half of the eighteenth century and proceeded at a gradually quickening pace during the nineteenth century. Willcox's revised (1940) estimates present a less plausible picture of leaping growth from 1750 to 1800 and a much slower rate of increase during the next half-century. Little reason for a trend of this form is apparent in the economic and social history of the region. Clark noted this anomaly and preferred to draw estimates for 1650 and 1800 from Willcox's original series. For 1750, Clark substituted a figure slightly higher than Willcox's original estimate, which improves the plausibility of the picture. As depicted in Clark's estimates, the population began to grow at a relatively moderate rate in the eighteenth century and stepped up the pace noticeably in the nineteenth century. Such a trend is in accord with historical information about economic developments and sanitary reforms, particularly in the cities of the region during the nineteenth century (Sanchez-Albornoz and Moreno, 1968, pp. 77ff.). However, these estimates may understate the size of the population and overstate its increase during the eighteenth and nineteenth centuries as a result of defective enumeration and incomplete coverage in the early censuses and failure of contemporary estimators to realize how many people actually lived in some of the areas where statistics were lacking. In my estimates (1967), I attempted to correct this bias by projecting back from recent benchmarks with somewhat lower growth rates than those indicated by the historical series of census statistics. The effect can be seen in the following comparison:

Population estimates, Middle and  
South America

|                                       | Willcox<br>1931 | Willcox<br>1940 | Willcox<br>amended<br>by Clark | Durand<br>1967    |
|---------------------------------------|-----------------|-----------------|--------------------------------|-------------------|
| Population in 1750<br>(millions)..... | 11.1            | 9               | 13                             | 16                |
| Annual increase per<br>1,000:         |                 |                 |                                |                   |
| 1750-1800.....                        | 10.6            | 18.8            | 7.6                            | 8.1               |
| 1800-1850.....                        | 11.1            | 7.2             | 11.0                           | 9.2               |
| 1850-1900.....                        | 12.9            | 12.9            | 12.9                           | 13.3              |
| 1900-1950.....                        | -               | -               | -                              | 15.7              |
| 1950-1970.....                        | -               | -               | -                              | 27.9 <sup>1</sup> |

The indifference range of 13 to 18 million for estimates of this region's population in 1750 is suggested in table 2, but an estimate as low as 11 million is not considered to be beyond the limit of credibility.

The range of uncertainty widens when we try to trace the population trend from 1750 back to the time of Columbus' voyages. Certainly the indigenous population was considerably reduced throughout the region during those two and a half centuries, and was completely annihilated in many areas, by the combined effects of epidemic disease, slaughter at the hands of the European intruders, and hardships due to disruption of the aboriginal economies and imposition of colonial regimes. The fact of depopulation is amply confirmed by documentary and circumstantial evidence, but the amount of the loss is highly uncertain. The extent of disagreement among scholars who have studied this question is illustrated by the following examples of estimates of size of the aboriginal population in America when Columbus set out on his first voyage:

1

Rate calculated from United Nations estimates.

Estimates of population of America  
in 1492 (millions)

|  | Total  | Middle and<br>South America | Northern<br>America |
|--|--------|-----------------------------|---------------------|
| Sapper 1924.....                       | 40-50  | 37.5-46.5                   | 2.5-3.5             |
| Sapper 1948 <sup>1</sup> .....         | 32.5   | 31.5                        | 1.0                 |
| Kroeber 1939.....                      | 8.4    | 7.4                         | 1.0                 |
| Rosenblat 1954.....                    | 13.4   | 12.4                        | 1.0                 |
| Dobyns 1966.....                       | 90-113 | 80-100                      | 10-12               |
| Clark 1968, after<br>Bennett 1954..... | 41     | 40                          | 1                   |

There are no records of pre-Columbian population in any part of America. Estimates have been made by different methods, all involving assumptions that are open to serious question. One approach, well illustrated by Sapper's work, is through an assessment of the population-supporting capacity of resources and technology in the different natural and cultural regions. In addition to the inherent uncertainty in such assessments, this approach encounters risks of error in the implicit assumption that population was governed closely by the means of subsistence. Another approach, followed mainly by Rosenblat and in part by Kroeber, is through historical records of population counts, estimates, and other relevant information given by observers in times of early European contacts with the aboriginal peoples in each area. One problem in this is the selection of data to be considered as reliable, which may be influenced by the author's preconceptions; and another, perhaps more important, is the risk of understatement due to failure to take into account depopulation prior to the dates of the earliest recorded information. Dobyns took a third approach, working backward from data on the remnants of aboriginal peoples in various areas at the times when they were reduced to the smallest numbers, with the

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1

In this revision of his earlier estimates, Sapper gave 31 million to tropical America and 1/2 million to non-tropical South America and apparently accepted Kroeber's estimate of 1 million in Northern America, derived from Mooney's work.



assumption of a fairly constant ratio of depopulation (original number in proportion to the number remaining at the nadir). The assumption of constancy in this ratio seems dubious a priori and it is a formidable problem to verify it empirically with an adequate sample of measures of the actual losses among populations in varied circumstances.

Clark took a position in the middle of a wide road by accepting Bennett's estimate of 41 million people in America about 1500. Neither Bennett nor Clark discussed the basis of this figure. I, too, am inclined toward middle-of-the-road estimates in this case. Figures within the wide indifference range of 30 to 60 million appear to me more credible, in themselves and in relation to the estimates for 1750, than lower or higher estimates.

Of course, there can be even less precision in estimates of America's population in earlier times. Bennett carried his series of estimates back from A.D. 1500 to 1000 with the assumption of a three-fold increase in America as a whole during the 500-year interval. Clark accepted Bennett's estimates and extended the series back to the beginning of the Christian Era by interpolation with an estimate by Putnam of 3 million in all America in A.D. 1, which was based on no data. This implies a much lower population density in America than Putnam estimated for Africa outside the Northern region in A.D. 1--only 1 person for 14 square kilometers of the total land area in North and South America. If there had been 3 million people at the time of Christ in the present areas of Mexico, Ecuador, Peru, and Bolivia alone, where systems of intensive agriculture and foundations for nascent urban civilizations were developing locally at that time, the average density within those areas would have been only about 0.75 per square kilometer.

Recent archaeological studies have contributed new light on population trends during pre-Columbian centuries, especially in the region of ancient

Mexican civilization. Quantitative archaeological surveys have been carried out in several parts of this region, with mapping and measurement of prehistoric settlement sites and counting of remains of dwellings within them. Although the data obtained in this way do not provide a very reliable basis for estimating absolute numbers of population, they give better indications of the relative levels of population in different periods of prehistory than have been available hitherto. Sanders (1972) has charted estimates, derived from such archaeological survey data, of trends in relative size of population from 600 B.C. or earlier to A.D. 1500 in the Basin of Mexico, various parts of the Lowland Mayan region, the valleys of Tehuacán, Oaxaca, and Nochixtlán in the southern Mexican highlands, and some areas in Guatemala. While the charts for the Basin of Mexico and the southern Mexican highland areas show fairly continuous growth of population up to the time of the Spanish Conquest, those for the Mayan areas show population peaks at various dates between A.D. 800 and 1200 followed by precipitous declines. Weighted averages of the estimated relative population levels at given dates in the areas of Mexico represented by these charts may serve as a crude indicator of the population trend in Mexico as a whole, although some important areas are not represented. In this way, estimates of the population about 1500 may be projected back over earlier centuries, as illustrated by the following examples:

|  | Population of Mexico |            |      |     |        |
|--|----------------------|------------|------|-----|--------|
|  | 1500                 | 1200       | 1000 | 700 | A.D. 1 |
| Weighted average index of relative population...               | 1.00                 | .81        | .71  | .63 | .33    |
| Projections from estimated population about 1500 according to: |                      |            |      |     |        |
|  |                      | (millions) |      |     |        |
| Sapper 1948.....   | 13.0                 | 10.5       | 9.2  | 8.2 | 3.3    |
| Rosenblat 1954.....  | 4.5                  | 3.6        | 3.2  | 2.8 | 1.5    |
| Dobyns 1966.....   | 30                   | 24         | 21   | 19  | 10     |

A large majority of the total population of America about 1500, according to all estimates, was in the two regions of Mexican and Andean high civilization and most estimates attribute approximately equal numbers to these two regions at that time. No doubt the same two regions contained a major fraction of the total population throughout the period of A.D. 1 to 1500, although the proportionate share of the Andean region especially seems likely to have been smaller in the early centuries. Spinden (1928) held that the population in the region embraced by the Incan Empire and the total in America reached a maximum about A.D. 1200 and decreased appreciably before the Spanish Conquest. He estimated the total in America about A.D. 1200 in the range of 50-75 million, without stating the arithmetic by which these figures were obtained.

The indifference ranges of population estimates for America in A.D. 1 and 1000 given in table 2 are very tentative. They suggest that estimates for A.D. 1 somewhat higher than the figure given by Putnam appear more credible in the light of present information, that the population increased largely during the first thousand years of the Christian Era, and that its growth was smaller between A.D. 1000 and 1500. This trend contrasts with the apparent trends in Europe and China. Extension of archaeological survey work in various parts of America may soon furnish a basis for better estimates.

#### The growth of world total population

The trend of the world total population since the beginning of the Christian Era according to Clark's estimates and those of several other authors is indicated in table 6. For perspective, the table also shows estimates of world population at the beginning of the Agricultural Age, about 10,000 years ago, when human societies first began to turn from hunting,

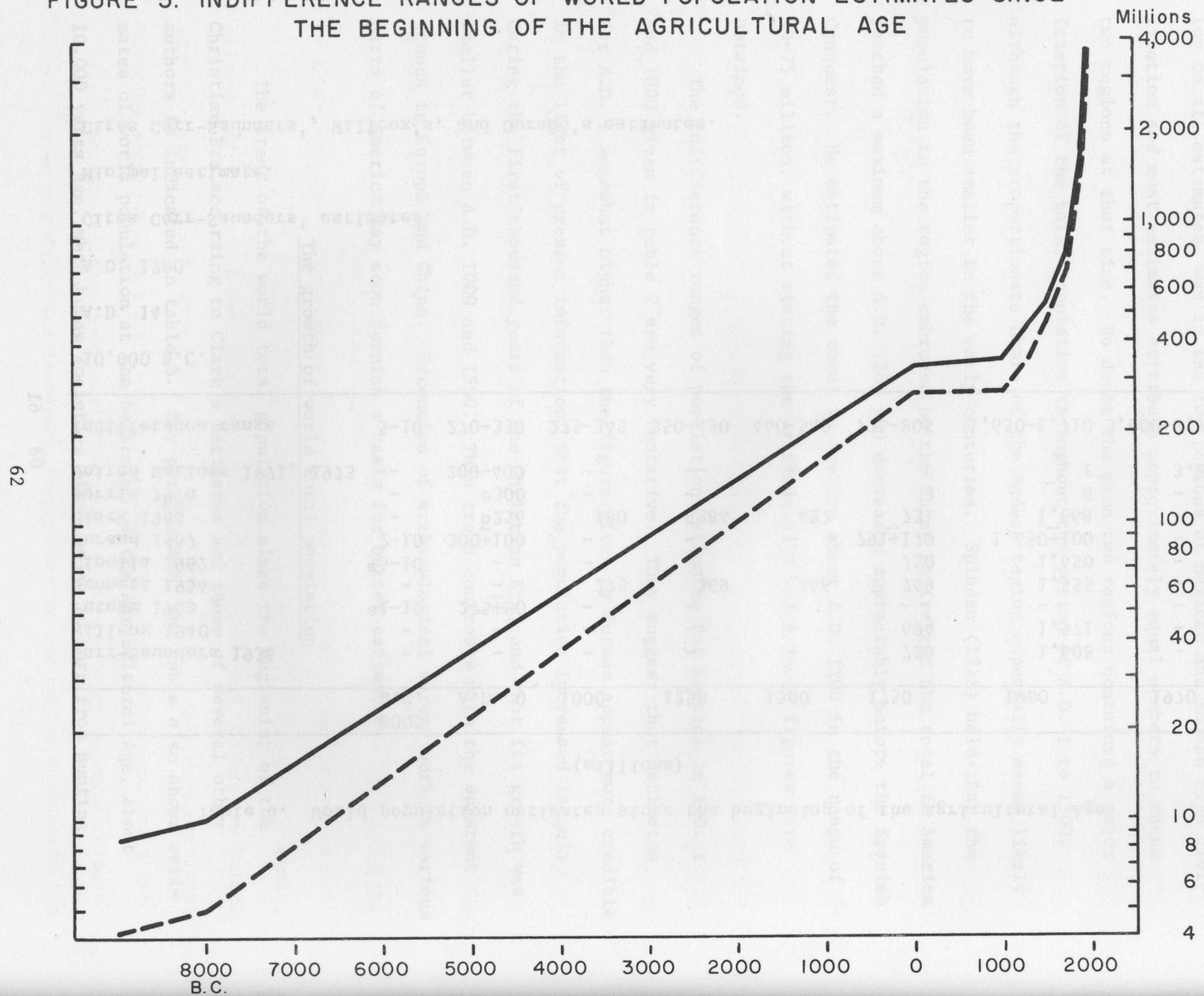


Table 6. World population estimates since the beginning of the Agricultural Age  
(millions)

|                           | 8000<br>B.C. | A.D. 0  | 1000    | 1250    | 1500    | 1750    | 1900        | 1970        |
|---------------------------|--------------|---------|---------|---------|---------|---------|-------------|-------------|
| Carr-Saunders 1936        | -            | -       | -       | -       | -       | 728     | 1,608       | -           |
| Willcox 1940              | -            | -       | -       | -       | -       | 694     | 1,571       | -           |
| Putnam 1953               | a1-10        | 275+80  | -       | -       | -       | -       | -           | -           |
| Bennett 1954              | -            | -       | 275     | 369     | 446     | 749     | 1,555       | -           |
| Cipolla 1962              | a5-10        | -       | -       | -       | -       | 750     | 1,650       | -           |
| Durand 1967               | 2-10         | 300+100 | -       | -       | -       | 791+170 | 1,650+100   | -           |
| Clark 1968                | -            | b256    | 280     | c384    | 427     | 731     | 1,668       | -           |
| Borrie 1970               | -            | e300    | -       | -       | -       | d       | d           | -           |
| United Nations 1971, 1973 | -            | 200-400 | -       | -       | -       | f       | f           | 3,632       |
| Indifference range        | 5-10         | 270-330 | 275-345 | 350-450 | 440-540 | 735-805 | 1,650-1,710 | 3,600-3,700 |

- a  
10,000 B.C.
- b  
A.D. 14.
- c  
A.D. 1200.
- d  
Cites Carr-Saunders' estimates.
- e  
Minimal estimate.
- f  
Cites Carr-Saunders', Willcox's, and Durand's estimates.

FIGURE 5. INDIFFERENCE RANGES OF WORLD POPULATION ESTIMATES SINCE THE BEGINNING OF THE AGRICULTURAL AGE



fishing, and gathering of wild plant food to agriculture as a way of life. At the foot of the table are the indifference ranges within which, in my judgment, there seems to be little basis for preference between lower and higher estimates. These ranges are narrower than the ranges of sums of the corresponding figures for regions in table 2 because one should not expect either high or low figures within the given ranges to occur in all regions. In figure 5, the long-range trend of world total population is charted by plotting the indifference ranges of estimates on a logarithmic scale so that the slopes of the lines connecting upper and lower limits of the ranges for successive dates reflect proportionate rates of increase during the intervals.

Estimates of the population at the dawn of the Agricultural Age cluster for the most part in the range of 5-10 million and one figure appears to be as good as another within this range. These estimates depend mainly on inferences from data on the densities of primitive nonagricultural populations observed in various parts of the world during recent centuries. Obviously, such inferences are uncertain and it is not assured that the actual population about 8000 B.C. was within the indicated indifference range. It can be seen in the chart, though, that the picture of the long-range trend would not be altered greatly by substituting estimates in a wider range, such as 1 to 20 million.

By any reasonable calculation, the average rate of growth of the world population between the beginning of the Agricultural Age and the time of Christ was much higher than it had been during the long ages of man's previous existence on the earth. This fact is attested by archaeological evidence from many parts of the world, which consistently indicates the presence of much larger numbers of people in the areas of evolving agricultural economy than had lived in the same areas by hunting and gathering in earlier times.



There is little factual basis at present for any estimates of world<sup>1</sup> population at dates within the long interval from 8000 B.C. to A.D. 0. For lack of data, the trend during this interval is represented in figure 5 merely by the straight lines which would correspond to growth at a constant proportionate rate, but it is not meant to imply that the population actually did grow steadily at an unvarying rate throughout these eight millenia. One may surmise that the rate of increase was probably relatively slow at first, when the development of agriculture was confined to comparatively small parts of the world, and it undoubtedly varied during subsequent millenia, possibly with decreasing trends in some periods. The history of the development of ancient city-centered civilizations in the Old World, with the accumulations of relatively large and dense agricultural population which they required, suggests that the third millenium before Christ may have been a period of comparatively large growth in the population of Asia and Northern Africa if not of the world as a whole. Major set-backs to those civilizations during the next millenium suggest a slow-down if not a pause in growth during that period. Resurgence of growth is indicated in the first millenium B.C., when the ancient iron-age civilizations of China, India, Persia, and the Mediterranean region were rising to their zenith.

The pendulum swung again toward slower growth or stagnation during the first millenium of the Christian Era. In spite of uncertainties in the estimates, it seems clear that population made relatively little gain if it did

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<sup>1</sup> Deevey's (1960) world population estimates of 86.5 million about 4000 B.C. and 133 million in A.D. 0 do not inspire great confidence. They were made by a dubious manipulation of estimates by Braidwood and Reed (1957) of typical population densities of the "primary village-farming" economy and "primary urban" economy. The Braidwood-Reed estimates themselves are doubtful generalizations from a slender basis of observations.

not suffer a loss between A.D. 0 and 1000 in China, Europe, Northern Africa, and Southwestern Asia. According to one interpretation, the settlement of large parts of these regions approached a point of saturation in relation to resources and technology during the late pre-Christian or early Christian centuries (Usher, 1930); but the renewed growth of population in many areas after A.D. 1000 casts doubt on this. Population may have increased substantially during the first Christian millenium in Japan, Southeastern Asia, Tropical Africa, and America, although quantitative evidence to corroborate this supposition is slight or nonexistent. At any rate, increases in the relatively small populations of these regions would not have carried much weight in the global trend.

The curve of the indifference ranges for world total population estimates turns decidedly upward about A.D. 1000 and indicates much larger growth between that date and 1750 than in the preceding 1,000 years. The period of A.D. 1000-1300 is marked clearly as one of expanding population in China and Europe; it remains as a question for historical and archaeological research how widely this trend extended in other regions of the world. The fourteenth century almost certainly witnessed a dip in the world population curve. The losses of life by the Black Death and its sequel of plague epidemics were certainly not limited to Europe and neighboring regions of Northern Africa and Southwestern Asia, although measures of the impact of the plague in Central Asia, China, and India are lacking. Another temporary set-back of world population growth may have occurred in the sixteenth century as a result of the depopulation in America. The amount of that loss remains undetermined; it might have been greater or less than the concurrent gains in Europe, China, and elsewhere.

The apparent parallels between phases of the population trends in China



and Europe since the beginning of the Christian Era pose puzzling questions of causal interpretation. Especially remarkable are the closely synchronized phases of population expansion in both regions during the eleventh, twelfth, and thirteenth centuries, again during the fifteenth and sixteenth, and once again in the period from about 1750 to 1850, and the almost simultaneous slow-down or set-back of growth in the seventeenth century as well as the fourteenth.

Finally, with regard to the extraordinary world-wide multiplication of population in the modern period, a major problem for historical studies is to improve information about the forms of the population trends in various parts of the world especially during the eighteenth and nineteenth centuries. Present information indicates that the trend turned decidedly upward during the eighteenth century not only in western Europe, where the demographic expansion was associated with the beginnings of industrialization and other developments of the modern age, but also, as already mentioned, in China, where these developments were absent, and in Russia, where they were minimal at that time. Certainly during the nineteenth century, if not earlier, the trend of accelerating growth was widespread in other parts of the world which were lagging far behind Europe in industrialization and modernization. In spite of the deficiencies of statistical records, it is clearly apparent that population increased substantially during the nineteenth century in Northern Africa, Southwestern Asia, India-Pakistan-Bangladesh, Southeastern Asia, and Middle and South America. If the global picture of timing of the upturn and relative speed of population growth in various parts of the world during successive periods since the early eighteenth century could be clarified, it would furnish a needed frame for study of the causes of the modern expansion of world population and its relations with the economic and other developments of the modern age.



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